electrical contracting

Industrial Electrification SECTION

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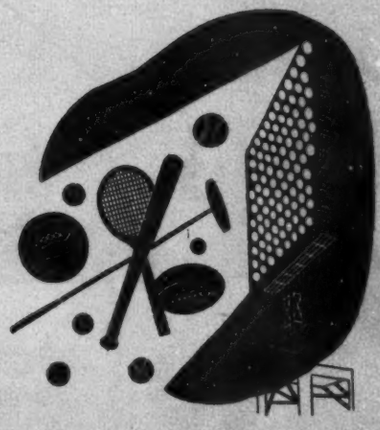


FEBRUARY • 1941

INSTALLATION MAINTENANCE ENGINEERING

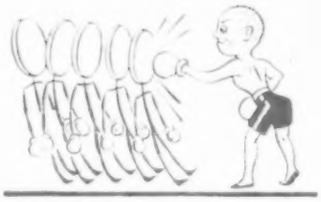
WANT TO ADD EASY PROFIT TO YOUR WIRING JOBS?

USE THIS G-E TIME SWITCH

TYPE T-44 AUTOMATIC TIME SWITCH

It's Easy to Install
Easy to Wire and
Saves Call-backs

It's easy to install because two mounting holes and a hanger lug give full provision for mounting. Five standard knockouts in the back, bottom, and sides make it easy to attach leads from any direction. And you don't need to remove the switch mechanism from the box to mount it.



It's easy to wire because the connections are clearly marked and there's plenty of wiring room below the terminals. Side hinges keep the cover out of the way and leave both hands free for fast work.

It saves call-backs because it's timed and powered by the well-known Telechron motor, and this assures long, accurate service without attention. Also, its silver contacts are conservatively rated at 35 amperes—they'll hold up easily under MAZDA, inductive, or resistance loads.

AND THIS TIME SWITCH WILL HELP YOU SELL YOUR WIRING JOBS

The G-E monogram on thousands of products is a symbol of reliability to users of electric equipment. They like its promise of service. Your reputation plus the G-E monogram on the time switch will help assure ready acceptance of your wiring bid. Write today for a copy of our bulletin, GEA-1427, describing this time switch in detail. You can obtain a copy from the nearest G-E Office, or from General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

ALL Murray

—and hung in a JIFFY!

EVERY trough and switch in this installation is Murray. If there were no service wires, it would just be a case of "hang 'em and forget 'em." But with knockouts all around and quick-acting, ever-tight Murray Solderless Connectors, installation is child's play. It's over and done with before you can say "Jack Robinson." Every feature of Murray Troughs is *modern*. Send the coupon for all the facts; for the reasons why it is good business for you to install Murrays. Metropolitan Device Corporation, Brooklyn, N. Y.

EXPANDABLE

METER TROUGHS

FOR SOCKET-TYPE METERS

Mail

METROPOLITAN DEVICE CORPORATION
Brooklyn, N. Y.

Gentlemen: Please send me free of charge and without obligation, 20-page Murray Meter Trough catalog.

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ADDRESS_____

CITY_____ STATE_____

protect PRODUCTION CIRCUITS

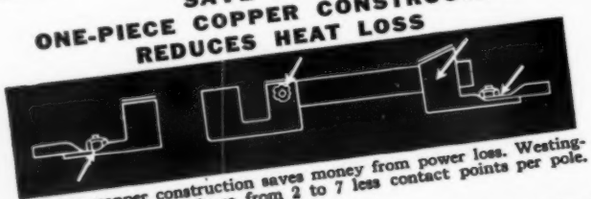
WITH WESTINGHOUSE SAFETY SWITCHES

SAVE MAINTENANCE
EXCLUSIVE DIAMOND-POINTED BREAK JAW KEEPS ARCING OUTSIDE CONTACT AREA

The ordinary way. Arc travels across switch jaw.

The Westinghouse way. Arc outside contact area.

SAVE POWER
ONE-PIECE COPPER CONSTRUCTION REDUCES HEAT LOSS



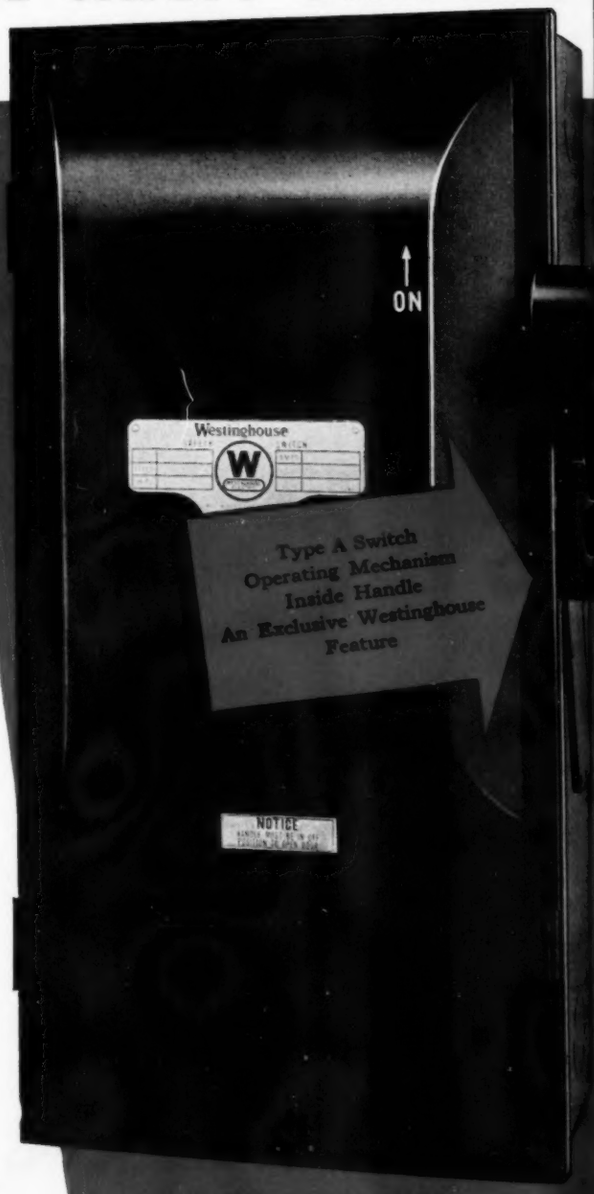
One-piece copper construction saves money from power loss. Westinghouse safety switches have from 2 to 7 less contact points per pole.

THESE FEATURES MEAN EASIER INSTALLATION —LOWER MAINTENANCE

Concentric knock-outs, top, bottom and both sides • Solderless lugs • Reinforced fuse clips assure maximum fuse contact and reduce heating. Warpproof, moistureproof Micarta crossbar • Steel parts cadmium-plated to resist rust and corrosion • Wearing parts of operating mechanism heat-treated for longer life • Door can be padlocked to prevent unauthorized operation • Switch operating mechanism inside handle on Type A leaves ample wiring space, prevents damage to conductor insulation • Non-carbonizing composition base • Quick-make, quick-break on Types A and C minimizes switch burning.

WESTINGHOUSE ELECTRIC & MFG. CO.
EAST PITTSBURGH, PA.

J-21147



Westinghouse offers a complete line of safety switches: Fusible and nonfusible; Types A and C for motor circuits and general use, Type D for general use; 30 to 1200 amperes; 125 to 600 volts.

Westinghouse

FOR PRODUCTION INSURANCE

buy Westinghouse

TIME SAVERS FOR INDUSTRY

WESTINGHOUSE "DE-ION" LINESTARTER

Magnetic Across-the-line Starter

CLASS 11-200

Push-button operated—built-in or mounted separately. Small, compact construction saves space. Bi-metal overload protection — hand or automatic reset. "De-ion" protection for contacts reduces maintenance. Vertical magnet operation speeds contact opening and prevents accidental operation.

WESTINGHOUSE AB-I BREAKER

For Circuit Protection

Eliminates switch and fuses. Bi-metal overload protection. "De-ion" protection for contacts. Saves maintenance time and production time—circuit outages can be restored by operator. No live parts exposed. Door opens only when switch is in "Off" position. Occupies approximately 40% less space than switch and fuses.

WESTINGHOUSE COMBINATION LINESTARTER

For Motor Control and Circuit Protection

CLASS 11-206

Magnetic motor starter—motor circuit switch—motor overload protection—nofuze circuit protection—all in one unit. Bi-metal gives permanently accurate overload protection. "De-ion" quenchers protect contacts—save maintenance. Four-in-one Unit saves installation time—saves space—saves wiring—provides greater protection for operators.

WESTINGHOUSE "DE-ION" MOTOR WATCHMAN

Manual Across-the-line Starter for Motors up to 7½ hp.

CLASS 10-100

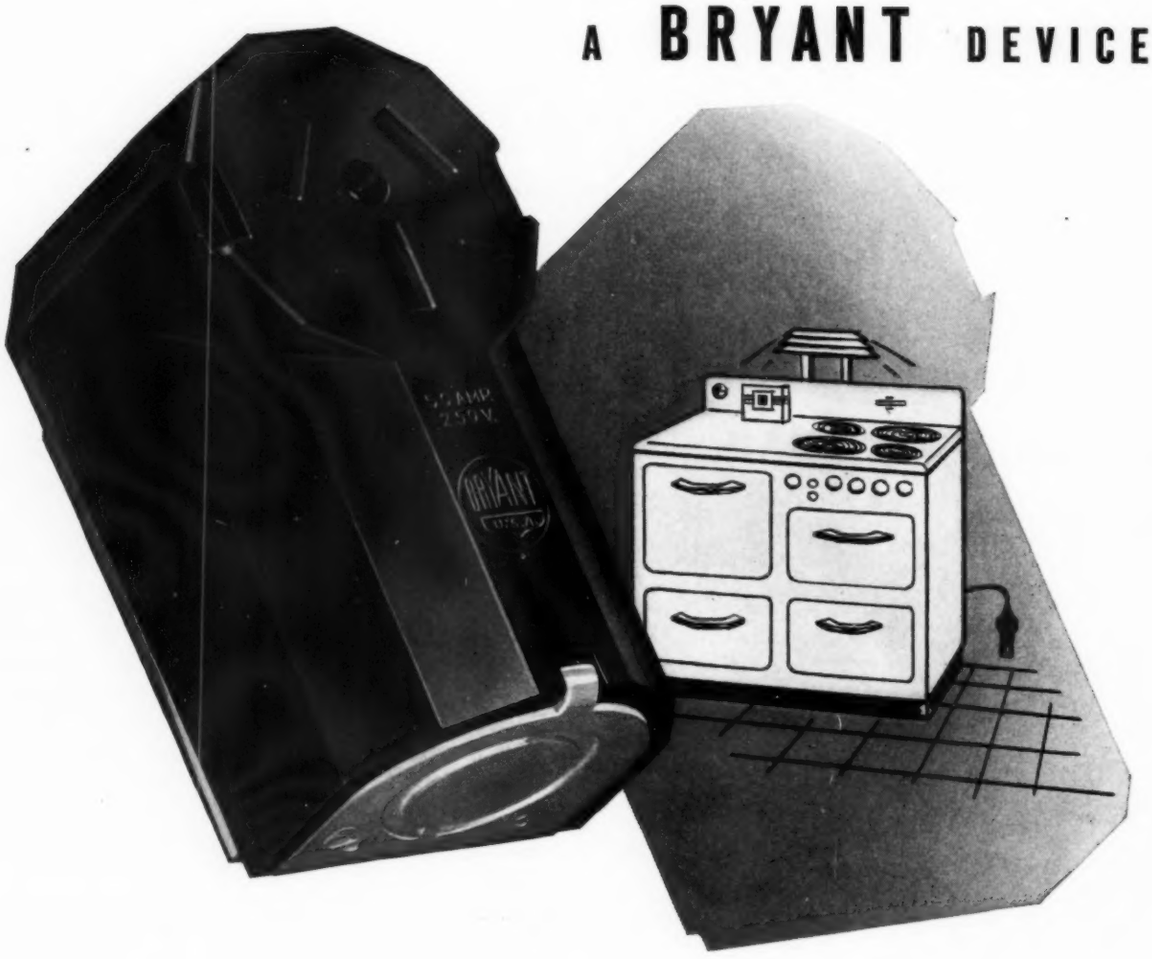
Quick-make, quick-break toggle action prevents "teasing" contacts. "On," "Off," "Tripped" positions self-indicating. Bi-metal disc overload protection. "De-ion" protection for contacts. Ample wiring space. Rust-resisting parts. Silver contacts. Keyhole mounting for quick, easy installation.

Call your nearest Westinghouse Sales Office or Distributor

Motors and Control

EVERY OUTLET DESERVES

A **BRYANT** DEVICE



Electric Range OUTLETS

There's new ease of wiring, Mr. Installer, in the Bryant 3826 Range Receptacle. Now with *one hand* you unscrew the new *one-piece* screw and washer from its terminal, lay the scraped wires in the groove and tighten down the screw and washer. The washer, *permanently attached to the screw clamp*, has a flat surface to grip the strands without injury. These new Bryant terminal assemblies will withstand a wire pull of more than 100 pounds.

BRYANT

SUPERIOR WIRING DEVICES

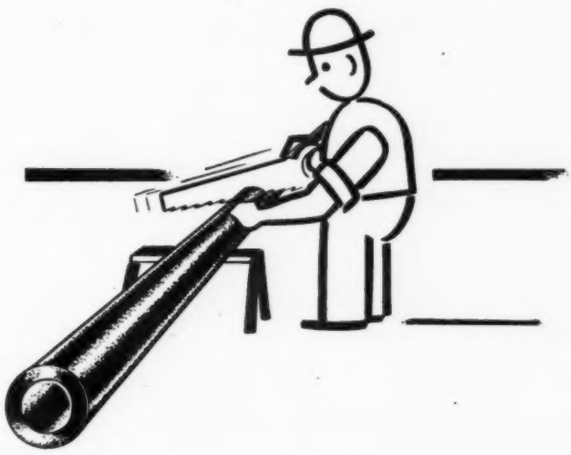
The Bryant Electric Company
Bridgeport, Connecticut

ADEQUATE WIRING SERVES AND SAVES

SOLD THROUGH ELECTRICAL WHOLESALERS NATIONALLY

Since 1901 *a subsidiary of* **WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY**

WHEN YOU CAN CUT CONDUIT AS EASILY AS THIS



You Can CUT *Installation Costs*

When you "hack" through ordinary "pipe" on the job, you cut into profits, too, for it takes plenty of time—and hacksaw blades—to get through three inches of metal.

There's no profit-eating cutting problem when you use Orangeburg Nocrete Conduit. Although it's strong and durable, it can be cut with a wood saw in a matter of minutes!

Try Nocrete on your next underground—and you'll find that it not only provides permanent cable protection, but because it costs less, assembles and installs more easily and faster than any other conduit you have ever used, there will be extra profit in every foot for you.

There's *extra* profit for *you* in every foot of

ORANGEBURG

NOCRETE CONDUIT

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GRAYBAR ELECTRIC CO., INC.

MADE AT ORANGEBURG, NEW YORK BY THE FIBRE CONDUIT COMPANY, 292 MADISON AVENUE, NEW YORK CITY

ORANGEBURG *Standard* **for installation *with* concrete encasement**
Nocrete **for installation *without* concrete encasement**

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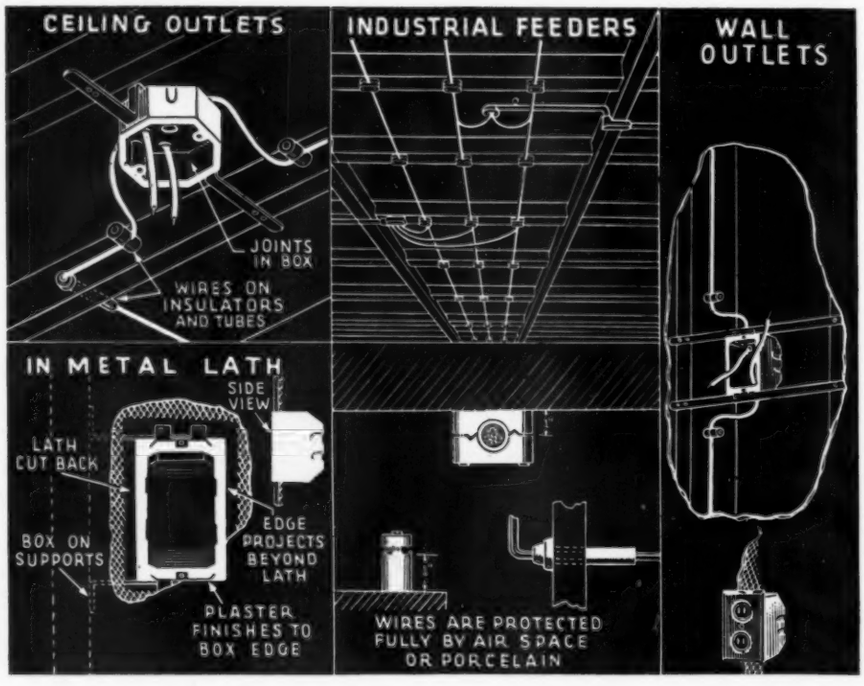
Use these units for a Complete Modern Porcelain Protected Wiring System

★ Safety and Adequacy Assured with Porcelain Protected Wiring, Using Porcelain Circuit Insulation, Porcelain Outlet Boxes and Modern Installation Methods.



Not so very long ago, the National Electrical Code required that all wiring should be constructed as though the conductor were bare. Not bad advice that. The number of electrical experts who still believe in that axiom are legion. Modern Porcelain Protected Wiring is the only system which approaches this principle of protection.

Porcelain supports hold the conductor firmly, fully an inch away from the supporting member without tie wires. Individual supports are used for each conductor throughout a Modern Porcelain Protected Wiring System in accordance with the rules provided in articles 320 and 324 of the National Electrical Code. Where conductors pass through supporting members, they are protected within porcelain tubes. Thus in runs between outlets conductors are supported upon or enclosed within porcelain, the best-known insulating material.

In Modern Porcelain Protected Wiring circuits terminate in outlet boxes of rugged electrical porcelain. Although the Code does not require a junction box at points where taps are spliced to the feeder lines, it is recommended that a porcelain outlet box be used. This is true of fixture outlets also, giving the added protection afforded by porcelain boxes. Porcelain junction and fixture outlet boxes can be mounted with box hangers or attached to wood supports. They provide a flush installed mount and are convenient as plaster support as the plaster adheres to the porcelain and makes a tight seal. All types of covers for these boxes are available.

Switch and outlet boxes of porcelain are designed in accordance with the standards of practice to which the contractor is accustomed. They may be supported to the side of the studding, with Kruse mounting strips, or flush with plaster or composition walls.

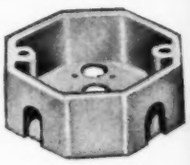
The contractors recognize at once the safety and protective features of porcelain outlet boxes. They minimize the possibility of shorts and grounds within the box. They do not collect moisture from condensation or temperature changes.

Kitchens, bathrooms and basements are locations where moisture may be present. Article 370 (Section 3720) of the Code definitely recommends that non-metallic boxes be used with an insulated wiring system in such locations.

A distinct advantage in using porcelain outlet boxes is the absence of the ordinarily required clamps to held conductors to the box. Article 370 (Section 3716) states that such clamps are not necessary with non-metallic boxes, for the knockout-out openings in porcelain boxes will not cause a short between conductors or ground to the box because porcelain is an insulator; hence, still greater safety and protection.

Electrical contractors will benefit by investigating the advantages of this latest development in wiring methods.

Materials for Modern Porcelain Protected Wiring Systems are manufactured by



Illinois Electric Porcelain Company, Macomb, Ill.

Knox Porcelain Corporation, Knoxville, Tenn.

Porcelain Products, Incorporated, Findlay, Ohio

and may be obtained through your electrical wholesaler

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Get these TWO ESSENTIALS in the FLUORESCENT LIGHTING you specify

WITH VAPOR-TIGHT COVER
...for locations requiring covered units.
RLM
WITH APERTURES
...for ceiling illumination.
WITH LOUVERS
...for greater lamp shielding.
BENJAMIN FLUORESCENT LIGHTING UNITS include BENJAMIN RLM "STREAM-FLO" 48 and 60". BENJAMIN SEALED-FLO. BENJAMIN SKY-FLO. BENJAMIN TWIN-FLO

1st Essential

LIGHTING PERFORMANCE that meets the high standards established by Benjamin, the RLM Standards Institute and the requirements of the Science of Seeing.

2nd Essential

DURABILITY that meets the Benjamin standards for heavy duty construction and durability to insure maintenance of long life efficiency and operation economy.

SOLVE DEFENSE PRODUCTION PROBLEMS WITH BENJAMIN FLUORESCENT LIGHTING

Complete information on Fluorescent Lighting for plants, laboratories, drafting rooms and other locations is contained in the new Benjamin Fluorescent Lighting Manual. Your copy will be sent to you without cost or obligation. Address any distributor of Benjamin equipment or write Benjamin Electric Mfg. Co., Dept. H, Des Plaines, Illinois, leading maker of incandescent, mercury and fluorescent lighting equipment for industrial and utilitarian use.

BE SURE TO Specify...

DISTRIBUTED EXCLUSIVELY THROUGH ELECTRICAL WHOLESALERS

FIRST ESSENTIAL

These Benjamin units provide the high levels of illumination and quality of light which will improve production, increase accuracy of workmanship, safety and all-around efficiency by increasing the speed and ease of seeing. By specifying Benjamin you are assured that the reflectors have been scientifically designed to insure proper control and direction of light. You are assured of higher reflection factors and light output; assured that the lamps are properly shielded from direct view to minimize glare; assured that the lamps are properly positioned; assured that ballast equipment corrects for power factor and flicker; assured that units comply with all electrical, mechanical, safety and lighting standards established by RLM Standards Institute, Lamp Manufacturers, Underwriters' Laboratories and others.

SECOND ESSENTIAL

One of the reasons for Benjamin's leadership is its reputation for making "lighting equipment that is built like a battleship." For forty years Benjamin has built only the highest quality lighting units whose durability has been a by-word in the industry. You will find this essential durability in Benjamin Fluorescent units. Greatest strength and rigidity are required in fluorescent lighting units because they are necessarily large, long and narrow. Because they represent a considerable investment, the lifetime efficiency of Benjamin porcelain enamel is essential. Because costly service interruptions can be caused by the improper functioning of ballast equipment only approved and guaranteed types are used in Benjamin Equipment.

BENJAMIN

TRADE MARK

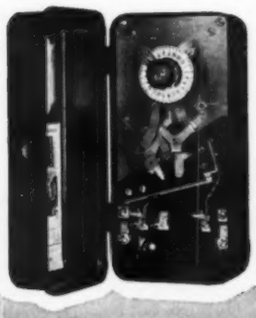
FLUORESCENT LIGHTING EQUIPMENT

SANGAMO

Time-Switches

...RATE TOPS IN THE SIGN INDUSTRY...

...THEY WILL PERFORM ACCURATELY AND DEPENDABLY FOR YOU!

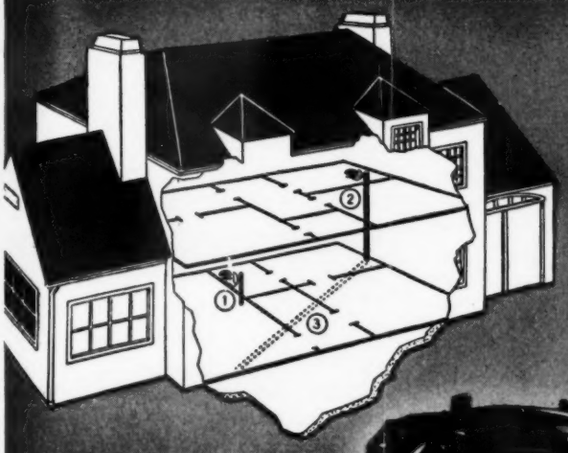


Form KA for installations where no variations are required from a regular daily sequence.

Form KAZ. The astronomic dial changes "on" and "off" operations in accordance with suntime.

Accurate, dependable performance has won Sangamo Time-Switches an enviable reputation with sign manufacturers. The heavy ampere loads of electric signs test the current-carrying capacity of the contacts, while accuracy requirements call for sustained punctuality. Electrical contractors, like sign men, who have used Sangamo Time-Switches know that these switches qualify unreservedly in both respects. If you want a time-switch that is punctual, dependable, and practically service-free—buy "Sangamo."

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS



TELEPHONE CONDUIT ADDS GREATER VALUE TO YOUR HOMES . . . .

Now still greater values can be added to the homes designed with multiple telephone outlets. Home owners appreciate their added convenience and step-saving features and accept multiple phone outlets as a sign of a modern home. The cost is no greater than standard light outlets.

A few short lengths of conduit, installed when the house is built, give assurance to the owner that the job is permanent, that nothing need to be torn apart in the future to change a phone location.

When it comes to conduit specifications—*specify Buckeye*—the largest selling conduit in America. Buckeye Conduit is made as a very important specialty by Youngstown, and the trade likes it because of its consistent uniformity and easy workability. A Buckeye Conduit specification for phone installations and all electrical requirements is welcomed by discriminating home owners everywhere.

Ask your distributor for Youngstown Conduit - Pipe and Tubular Products - Sheets - Plates - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes.

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

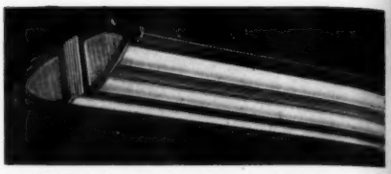
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steels

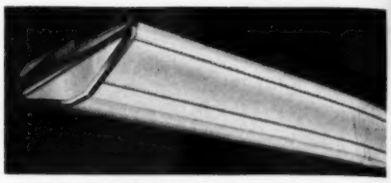
General Offices - YOUNGSTOWN, OHIO

Guth Offers You

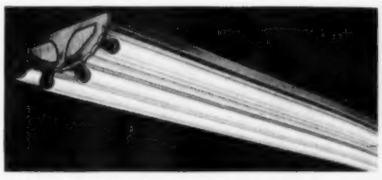
New Money-Making Opportunities in FLUORESCENT LUMINAIRES!



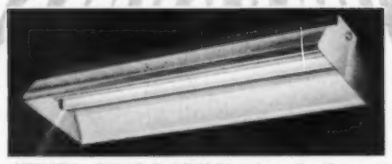
TRU-CO-LITE Direct-Indirect Luminaire for stores and offices. The ultimate in fine styling—plus more light output with individual *diffuse* ALZAK Aluminum Reflectors for each lamp.



EXCELUX FLUORESCENT—Full-screen lamp diffusion is effected with either Glass or Plastic Shield—at same low cost. An ingenious hinged arrangement releases the shield at one end for access to lamps, starters, and covers.



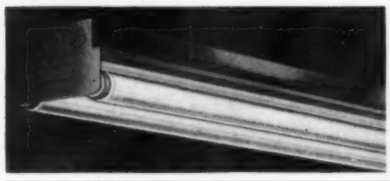
GUTH GLOW are constructed with elongated flutings of Satin ALZAK Aluminum to harmonize with the characteristic design of Fluorescent lamps. Cast Aluminum Ends.



UTILITY FLU-O-FLECTORS for 2—40 watt, 3—40 watt, 4—40 watt and 2—100 watt lamps stand up under hardest use—do a better lighting job. Removable ALZAK Aluminum Reflector for easier maintenance.

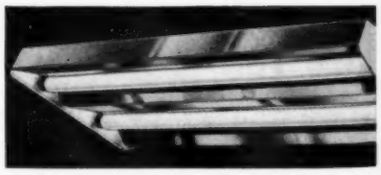
Commercial Luminaires *for Offices and Stores*

TROFFER LIGHTING: Patented Light-O-Day Baffles provide ceiling illumination in recessed installations. Also Troffers for Glass Bottom or Plastic Diffusers. Innards easily accessible from below.

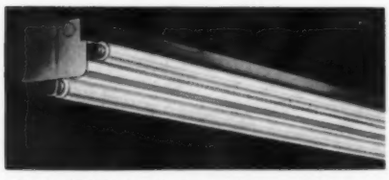


ONE & TWO LITE FLU-O-FLECTORS—either Symmetric or Asymmetric Reflectors of ALZAK Aluminum—for localized or general industrial illumination. For lamp sizes from 1—20 watt to 2—40 watt inclusive.

Industrial Luminaires *for Factories*



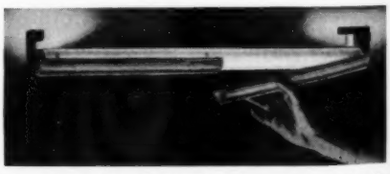
SHOW WINDOW FLU-O-FLECTORS provide dynamic sales lighting with necessary "punch". "Turn-around" reflectors for deep or shallow windows. For all lamp sizes.



GUTH STRIPS for Factory Offices provide complete, low cost lighting. Carried in stock for all lamp sizes. Easy to handle—easy to install—easy to sell.

ALZAK ALUMINUM REFLECTORS

Sell GUTH Fluorescent Fixtures with *diffuse* ALZAK Aluminum Reflectors for better satisfied customers. Durable, easy-to-clean, more efficient—the *better* reflector.



P. F. C. PLASTIC DIFFUSERS snap on and off Fluorescent Lamps—reduce the brightness of the bare lamp, yet are more efficient in light transmission than are diffused glass panels. Made in two designs—and in colors.

Write for new GUTH Catalog No. 37, featuring the complete Fluorescent line. Free engineering and layout service at your command for office, store or factory lighting systems.

IMPORTANT: Send us the names and addresses of your salesmen, so that we may send them our helpful, sales-creating literature.

THE EDWIN F. GUTH COMPANY

2615 Washington Blvd. **St. Louis, Mo.**

Leaders in Lighting Since 1902

Guth

electrical contracting

With which is consolidated The Electragist and Electrical Record
Established 1901

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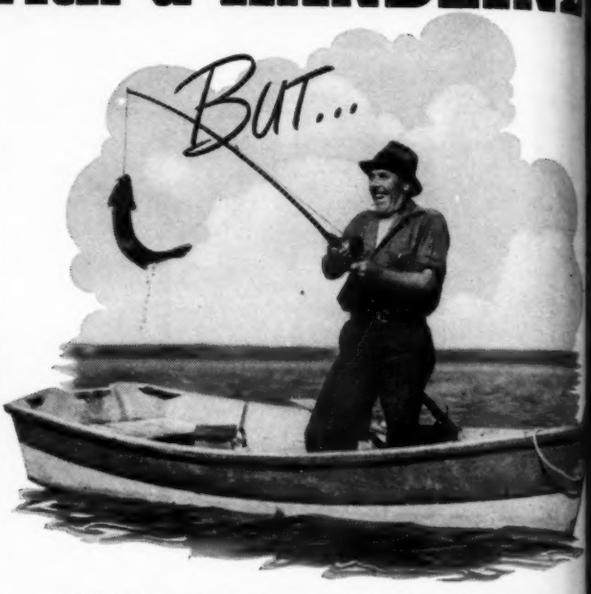

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electrical contracting

FEBRUARY, 1941

Another Dodo

LIN YUTANG, THE POPULAR CHINESE COMMENTATOR, in his recent book, *"With Love and Irony,"* records this suggestion. The ideal combination for a pleasurable life, he says, would be "to live in an English country home, engage a Chinese cook, marry a Japanese wife and take a French mistress."

WELL MEBBE. I DUNNO. But it sounds complicated. And few people have much fun without a pretty clear purpose and a simple program. Then they must stay behind it—to get anywhere. For example, look at small diameter wire. Right now, it's deader 'n a dodo.

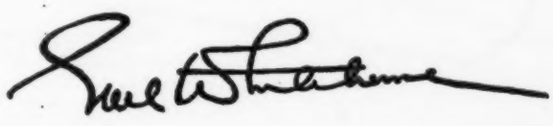
AFTER YEARS OF BLOOD AND TEARS, the power company men fought this good idea to victory. Contractors and inspectors gave in. Manufacturers produced a safe new wire. But having won approval in the Code, the power men dropped the baby on the first door step. They went off looking for something else to do.

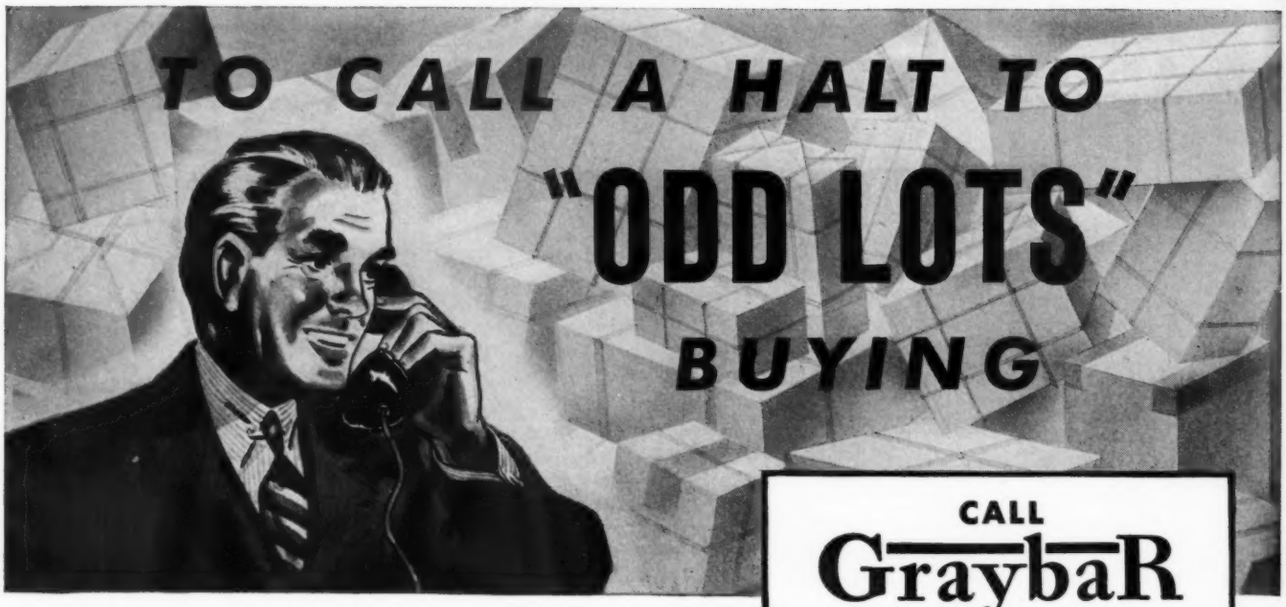
IT WAS "ROMEX" ALL OVER AGAIN. In each case the power men wanted a product so they could sell an idea. They got the product and forgot the idea. Non-metallic sheath cable languished ten years before it won itself a good market. Must we wait ten years with small diameter wire? Some 500,000 commercial buildings need re-wiring.

SO NOBODY IS SELLING THIS GOOD IDEA and a year has passed. We're getting no where with it. For this plan of pulling more capacity into old conduit will only roll when it is accepted by building owners and managers. And they will not be interested until they see competitive advantages to gain in terms of better buildings, better service, better tenants, better earnings.

AND WHO CAN PROMOTE THIS IDEA TO ALL BUILDINGS? It is not the manufacturer's job. The wholesaler won't. The individual contractor would be a fool to try. Only the power companies can afford to. They get more revenue from every re-wired building—continuing through the years. So they must sell the building people. It's their idea. It's their job.

THE QUESTION IS WHAT CAN BE DONE to bring this dodo back to life in your town? Well, the first thing is to put it squarely up to your local power company top man. Has an industry committee called on him in your town? Why not? Contractors, wholesalers will be glad to help. Factory plant men will welcome aid in selling their managements. There is profit and progress in it for all.





★ GENERAL PLANT LIGHTING
★ WORK AREA LIGHTING
★ PROTECTIVE LIGHTING
★ HIGH BAY LIGHTING
★ OFFICE LIGHTING
★ FLUORESCENT or INCANDESCENT

Wherever you plan for new or modernized lighting — in plant, office or yard — why purchase lighting equipment piecemeal? Here's a more satisfactory solution — put in your plan "via GRAYBAR" and secure a single source for every need for lighting equipment, auxiliaries and supplies.

When you call on GRAYBAR, in addition to the newest and best products, you get able aid from the GRAYBAR Lighting Specialist. He can help you decide on the right type and correct locations for the new fluorescents and other forms of modern lighting. This specialized service assures the most effective and productive light for every area — inside or out.

Call the GRAYBAR office nearby or write direct for information, mentioning type of application.

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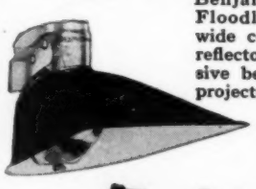
There are many places you can use the new RLM *fluorescent* lighting units to provide more effective, lower-cost light in plant, office and for sales displays—daylight in a dozen ways.

Buy SILVRAY (silvered-bowl lamp luminaires) — high-efficiency, sight-saving, indirect lighting combined with beauty in design, plus long life, low maintenance cost, easy lamp replacement.

Benjamin Glassteel Diffusers assure soft, even light over a wide range of intensities. Direct and reflected glare is eliminated. Complete with hood, reflector and globe.

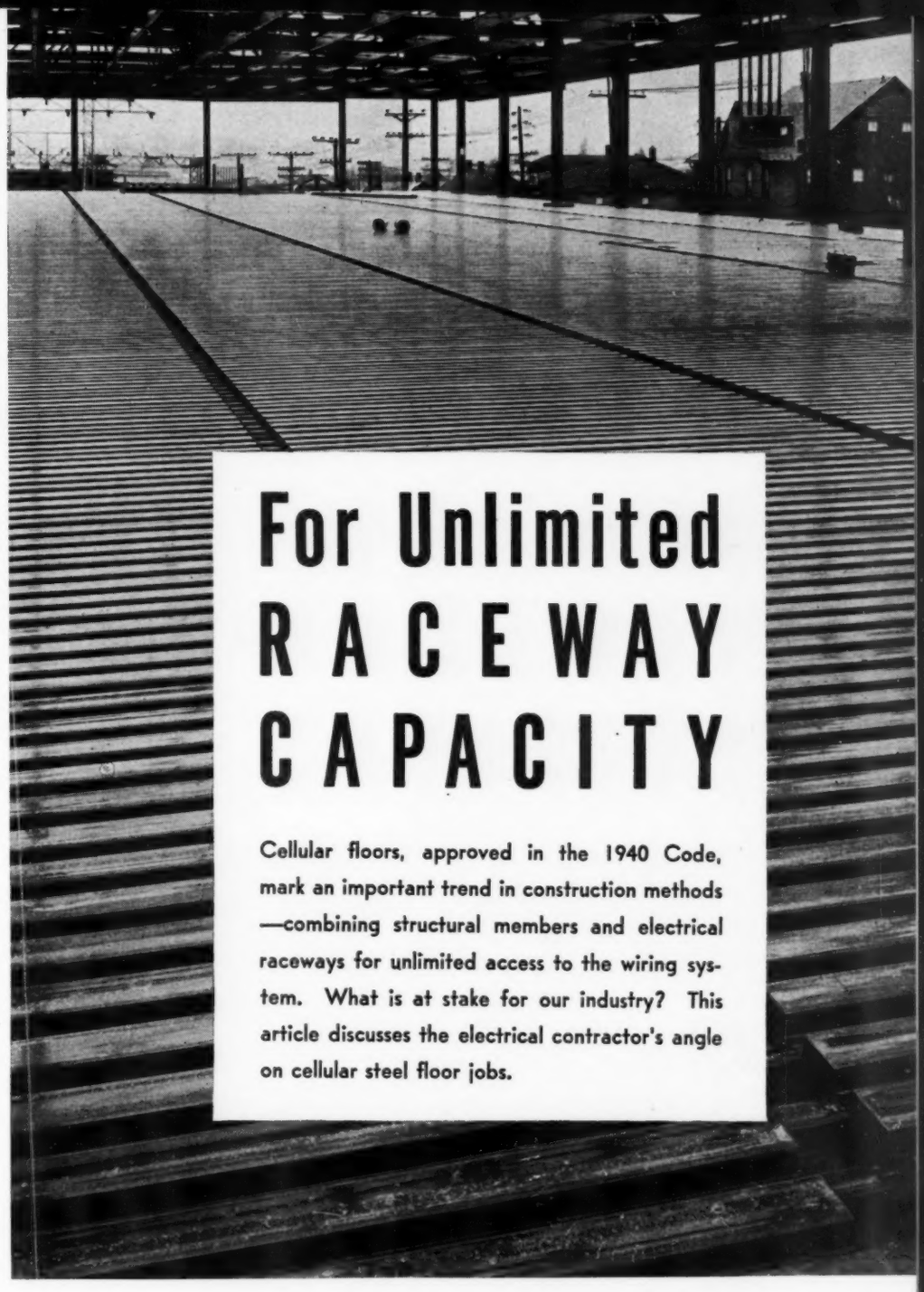


Benjamin Duo-Service Floodlights combine a wide coverage diffusing reflector with an intensive beam floodlighting projector. Light a wide area and floodlight a particular spot *at the same time.*

Crouse-Hinds floodlight projectors, floodlights and searchlights in types and mountings for short, medium and long-range use—productive and protective lighting for yards, sidings, storage tanks, loading platforms and other outdoor areas.

BULLETINS AVAILABLE

Send today for copies of interesting bulletins giving the complete story on any of the above fixtures.



For Unlimited RACEWAY CAPACITY

Cellular floors, approved in the 1940 Code, mark an important trend in construction methods —combining structural members and electrical raceways for unlimited access to the wiring system. What is at stake for our industry? This article discusses the electrical contractor's angle on cellular steel floor jobs.

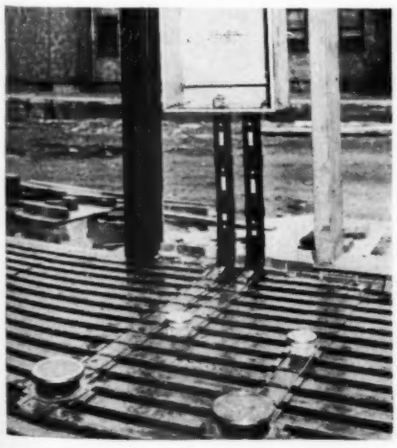
By W. T. Stuart

OF the many revisions in the 1940 National Electrical Code there was one that passed with little notice among the more controversial items. It was a new article 356, titled "Cellular Metal Floor Raceways." Few electrical contractors have had much experience with them.

But there are today over 200 major building projects using cellular metal floors. Some now under construction are—Colt Arms, office building, Hartford; General Electric Co., office building, Lynn; Commercial National Bank, Shreveport; Packard Motor Co., office buildings, Detroit and Flint; Denver City Airport, administration building; Washington National Airport, administration building, Gravelly Point, Virginia; Acme Brewery Co., warehouse and service building, San Francisco.

Cellular steel flooring provides wiring raceways for signal and power systems. It requires special tools, new layout methods and important changes in estimating and job management by the electrical contractor. The floors are primarily structural, but designed to provide parallel wiring raceways on 6-in. centers over the entire floor area. The raceways are accessible by means of specially designed fittings at any point.

Against the competition of other structural methods, the cellular floor manufacturers claim strength, lighter weight, quick installation, high salvage value. And important to the electrical contractor, they claim the practical elimination of electrical obsolescence.



PANELBOARD CIRCUITS *run to cells in jack headers. One-foot duct sections and ells connect to cell headers.*

As more and more attention in building design goes to provisions for electrical service, the manufacturers of cellular floors are placing increased emphasis on its raceway characteristics. During recent years, engineer J. J. Siddall of the H. H. Robertson Company has displayed cellular floor equipment at meetings of electrical contractors and electrical inspectors. The active interest of electrical men is recognized as vital to the development of cellular floor wiring systems and consequently to its wider structural use.

Because the basic metal flooring is installed by other trades, some electrical contractors viewed early jobs with alarm. It looked like a step toward cutting down the value of the electrical contract. They feared a considerable reduction in the amount of conduit work. It threatened to take the raceway out of the control of the electrical inspector.

Installations upon which records are available show, however, that the total electrical contract tends to run higher than if conventional wiring systems

FLOOR INSERTS *take a 1⅝ inch hole and a forming tool. Cells are alternately power and telephone raceways. Four inch square boxes will enclose plug receptacle and telephone outlets.*

POWER HEADER *on New Orleans Federal Office Building is set by electrical contractor in pre-fabricated slot. Alternate access and crossing units pick up every third cell.*

CEILING OUTLETS *are wired conventionally for a suspended ceiling. Conduit runs between outlets and switch legs follow ordinary layout practice. Home runs extend to a floor cell.*

were installed. Actual direct comparison is hardly feasible, however, because—

1. The available capacity of the raceway system can not be practically duplicated by other wiring systems.

2. The layout practice used on cellular floor systems provides for complete access including many cells which, though available, may never be used.

The question of whether cellular floors mean more or less in the total contract amount to the electrical contractor must be answered from considerably more industry experience. As it stands now, there is no indication that electrical contracts on such buildings are materially less than it would be for a similar building without the cellular raceways. Obviously, the cellular steel floors absorb part of the function of branch circuit conduits and under-floor duct systems. But several other factors enter in also—

3. The use of suspended ceilings usually requires conventional overhead conduit wiring. While the floor cells above may be used to carry home runs the usual practice is to bring a home-run down from each bay at a column to a floor cell below.

4. Feeder systems employed on cellular floor jobs are conventional and rarely utilize the raceway space in the floors.

5. Installation of headers, panelboard connections, utilization circuit taps and outlets in the floor cells requires a high order of mechanical skill and represents a large item in both material and labor.

6. Easy availability of raceway space tends to increase the number of points of utilization and access.

The flooring is installed by metal workers, and is welded or bolted to the building frame. Header openings are cut at the factory. Headers and all fittings are included under the electrical contract and sold directly to the electrical contractor.

Headers, crossing and connecting to the cells, are placed in the factory fabricated slot left in the floor units. The headers consist of interchangeable overlapping units six inches long. When in place they form a continuous fishable raceway at right angles to the cells. They are installed by means of sheet metal screws.

Panelboards are usually laid out to line up with the end of the header, connecting through an ell and duct fittings. But they may feed into the system by means of jack headers or conduit connections.

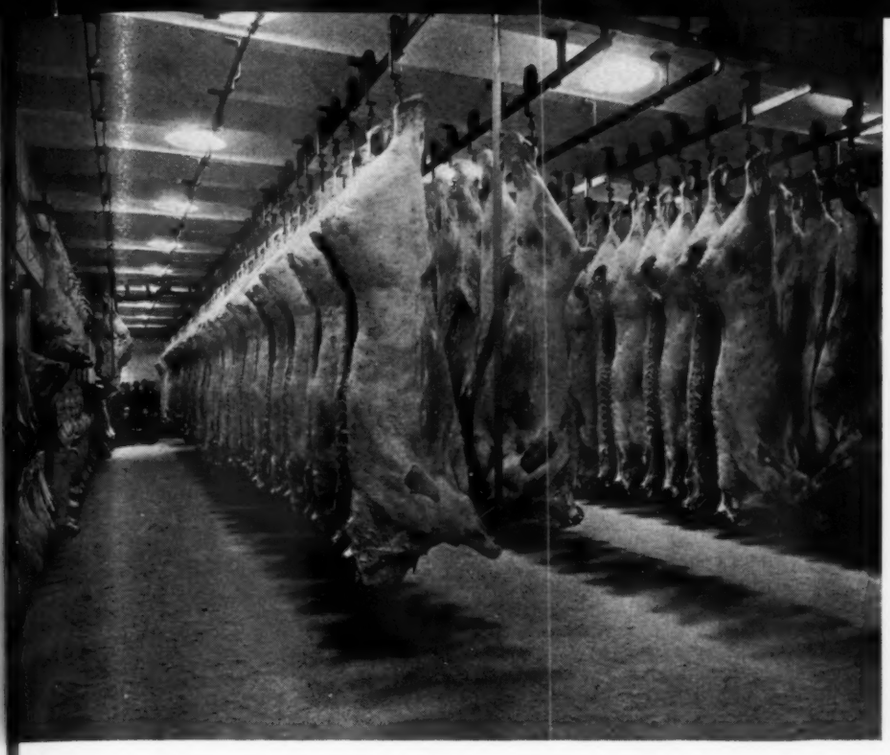
Conduits for the lighting systems, plug receptacles or other extensions connect through cell ell fittings, requiring a 2-inch diameter hole cut with a hole saw, in the top of the cell. The fitting is attached with four sheet metal screws in holes drilled with a number 9 drill. Floor taps require a 1⅝ hole.

Wiring capacities of headers and

[Continued on page 68]

CONVENIENT ACCESS *at virtually any point to an electrical raceway allows spotting outlets freely and handily. Outlets for this sewing machine department were set and wired by a man and helper in five hours.*

COLUMN RECEPTACLES *and lighting home runs are extended from the floor cells through conduit-to-cell connectors.*



SPOTLIGHTED STEAKS. *Glassteel diffusers produce 20 foot-candles of glareless, shadowless light on the dressed meat hanging in this cooler display room.*

EYE LEVEL *illumination of uniform intensity is necessary in the inspection and choosing of meat for the buyer must depend on his eyes.*

This Light Sells Meat

With the proper type of light—and plenty of it—this Portland, Oregon wholesale meat cooler display room shows the hanging meat to the best advantage and helps it bring top prices.

WHEN you go into the meat market to buy that juicy steak that you want for dinner, light is an important factor. For you want to see what you are buying. For the same reason light is very important to the wholesale meat establishments, especially in the cooler display rooms where the buyers come to inspect the dressed animals. And it is essential that the right type of lighting be installed to facilitate the close inspection which buyers give the hanging carcasses.

Realizing this, the president of the Portland Provision Company gave the following, all inclusive, specifications for the lighting in a new cooler display room. "I want the best lighting job you can give me."

A. C. Tice of the Tice Electric Co. and Ed. Kerr of the General Electric Supply Co. went to work and did just that. Their problem was to produce at least 20 foot-candles of even, shadowless illumination at eye level along the rows of dressed animals in the cooler.

The cooler display room is 40- by 90-feet in size and holds about 250 dressed animals suspended from hooks traveling on an overhead trolley system. There is 11-feet clearance between the floor and the bottom of the concrete beams which are 6-inches thick, 24-inches deep and spaced on 7-foot centers.

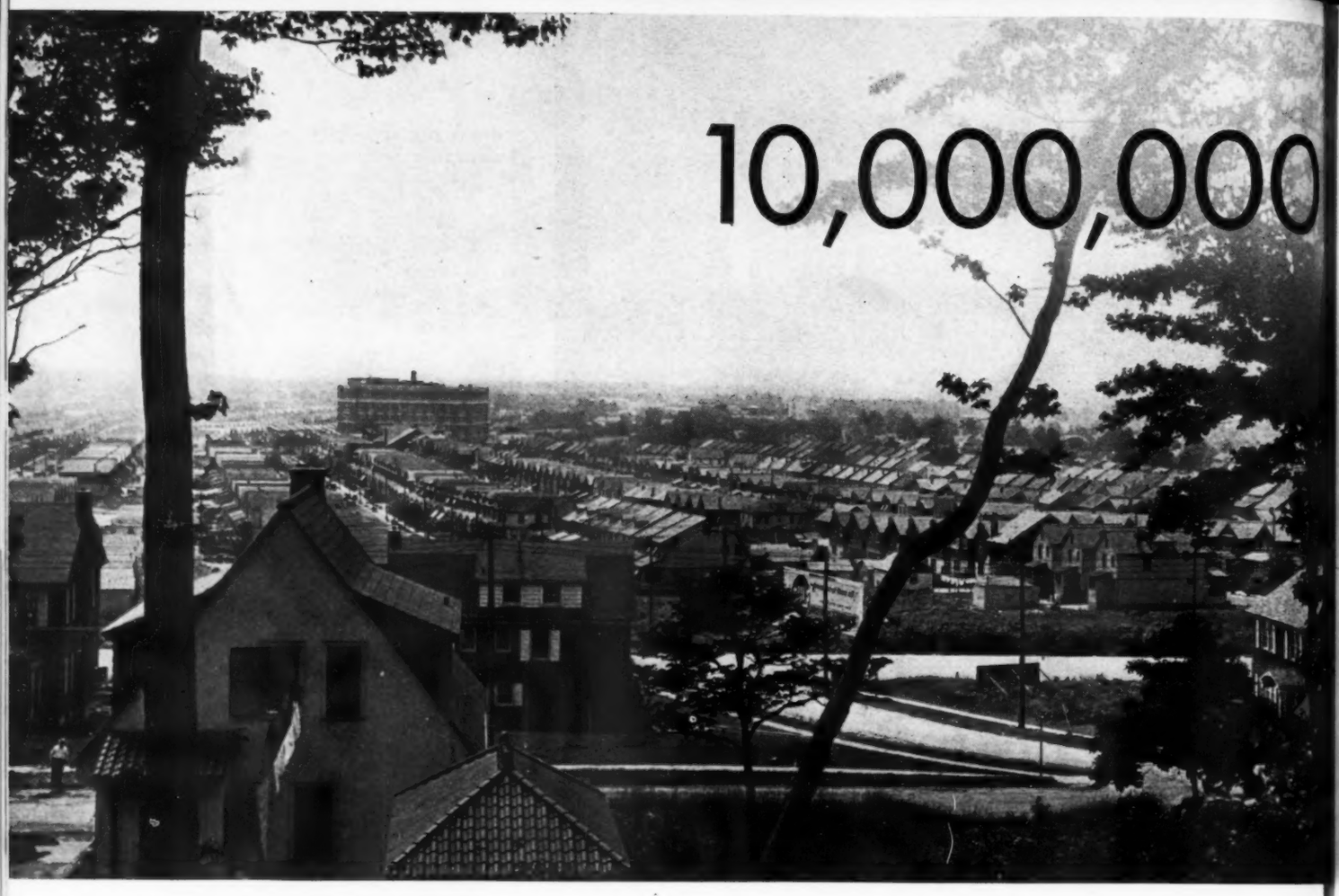
To provide the light required, 29-300-watt Ivanhoe Glassteel diffuser units with opal globes were installed in three rows, two of 10 units, the other of 9 units. The fixtures were mounted between beams on conduit stems of the proper length to bring the bottoms of the reflectors flush with the under side of the beams. This eliminated shadows and still cleared the overhead trolley system. Moisture-proof wire was used throughout the installation. Three-way switches were mounted near the doors at either end of the room each controlling a group of five lights.

A. C. TICE *of the Tice Electric Co., who sold and installed the lighting in the cooler room of the Portland Provision Co., Portland, Oregon.*

While these reflectors are used normally in industrial applications, they worked out very well in this special type of installation. Now using only 200 watt lamps, they produce better than 20 foot-candles of glareless, shadowless light on the selling plane, six to eight feet from the floor.

The successful solution of this problem won the contractor an "extra" to light the company's loading platform and more important—a completely satisfied customer, which is the best advertising a contractor can have.

Remarked Jakob Gallus, president of the Portland Provision Co., "My dealers tell me they like to come here to pick out their meat because the light is so good. That is a decided help in selling my product."



The way is open for the re-wiring of ten million houses in America. Re-wiring companies with mass production methods can open up this market for us all. But the larger contractors of each city must head this parade to prosperity.

By Earl Whitehorne

AWHILE ago I put a question to the heads of a number of power companies, north and south. I dropped in on the president or the right vice president. I said—

"Some part of twenty million dwellings in America have got to be rewired. A lot of 'em are in your territory. What are you doing about it?"

"Nothing," was the answer in every case.

"Well for God's sake!" I exclaimed, or words to that effect. "Don't you realize that your residence market is dying on your hands? Tight wires are causing voltage drop and a creeping paralysis is spreading over your system.

"You can't go on selling more and more appliances and IES lamps when you know that everything you sell will slow down when the customer gets it home. You can't sell brilliant lamps that will be dull where they are used. It isn't honest. And when the public finds it out they will quit buying and hate you for it."

"We know it," they said. "But what can we do?"

"Do?" I exclaimed. "We must get all the old houses in the town rewired. But it must be done, not some day, but in the next five years."

"We have an Adequate Wiring Bureau here that is working on the problem." This comment would come next.

"But so far that concerns new houses only," I pointed out. "Yet all the people who now use your service and buy bigger lamps and more appliances live in houses already built and inadequately wired. Your A/W Bureau is doing nothing about that—except warming up the minds of electrical men perhaps. Your problem lies in old homes and if you don't act quickly, we're all going to be licked. Electrical expansion in the home will be over, power public relations will go sour and your goose is cooked."

We talked it over. In every case the man admitted the danger in the situation. And then he asked—

"What can we do about it? Have you any suggestion?"

And I had—this one—

"Why don't you call in five or eight or ten of the largest and most responsible electrical contractors in your territory and put the problem to them?" I said. "Show them the urgent need and the enormous volume of waiting business.

"Ask them to jointly incorporate a separate company to rewire houses by mass production methods. This company would use standardized methods and materials and send out highly trained unit crews served by rolling shops. Jobs would be sold well in advance, the wiring to start say in three weeks so that the men are always working on a planned schedule."

I pointed out that these strong contractors now do only industrial and commercial work. They do no house wiring because there is no profit in it for them—job by job—at present prices.

HOMES to WIRE *This Way*

But for 10,000–20,000 houses there would be money in it and at low prices at which re-wiring can be sold.

In every case, this seemed to be a new thought to the power company man—at least he became immediately interested. He said that with such a setup they could advertise and promote house wiring. But do we know how to sell it?

"We can sell it as easily as any other good thing that offers a benefit to people," I said. "We can develop a demonstration technique that will sell re-wiring as easily as the light meter sells IES lamps.

"I believe that it will be done by showing the voltage drop between the meter and branch circuit ends, but talking not voltage but pressure of current, brilliance of light, speed of cooking, waste of money in heating wires—as well as loss of comfort. It will sell more circuits, more outlets and clean out the extension cord evil?"

And then I pointed out the major obstacle to such a plan. The inevitable opposition of smaller contractors to close teamwork between the power company and such a Re-Wiring Company. There would be immediate complaints.

"And what's the answer?" I was asked.

"The answer is very simple," I explained. "State that these men have organized to do this job, that can't be done without a large organization and plenty of money. For the job isn't to wire houses one by one but by the hundreds — thousands. The Re-Wiring Company will have its own salesmen out and advertise. You will back it with a strong campaign.

"This will create a great volume of business, much of which will go to smaller contractors because their regular customers call them in. Other contractors may also form re-wiring companies if they wish to. And the big Re-Wiring Company will hire many of the men who now do wiring on their own—day's work or with a man or two—and give them steady jobs as foremen or journeymen on a good pay roll."

Every contractor will benefit. But the campaign is made possible only because strong contractors with financial and engineering resources, organization and specialized equipment will prepare themselves to wire thousands of houses with mass production methods.

Well to cut a long tale short, each of these power company men was keenly interested. They wanted to think about it. It might be the way to get the problem cracked. They knew no other way. And no progress is now being made. They thanked me for coming in. So I left them and called on a contractor.

I have talked the same idea to perhaps a dozen electrical contractors in as many cities. These were all large contractors now doing no house wiring —except very large jobs. But I found each of them interested in the possibilities of such a plan. For a thousand houses is something else. In several cases we listed down the men of that city who should be logically invited into such a Re-Wiring Company. They wanted to think about it. And that's where the matter stands.

Of course, this may not be the way to do this job at all. Nobody knows until it is well tried. But it has possibilities. And the need is urgent.

For year after year, people are loading more appliances and lamps upon their already outgrown circuits. Already roasters are being set aside because they cook too slowly. IES lamps are being abandoned because they cost too much for the disappointing light they too often give. The popularity of electrical home comforts is threatened. And we stand by and watch it!

But it is not just a matter of avoiding trouble. Here wait millions of dollars in good profit business! But it will only come when we re-wire five—ten million houses—one—two million a year.

And when we do, every electrical contractor will be rolling in business and in prosperity. For the big Re-Wiring Companies will stir up so much work that everybody will be in it up to his neck and making money.

Figure it out for yourself. How many dwellings are there in your section? Talk it over with the other contractors. Discuss it with your power company. Do something about it. And why not do it now?

Remember Youngstown?

Some electrical contractors will sniff at this suggestion. Well, sniffing is fun. But this is not just a theoretical suggestion. The idea is borrowed bodily from Youngstown.

Youngstown was installing thousands of ranges. Wiring prices were so low that established electrical contractors could not take the work. So a group of them incorporated a Mass Production Range Wiring Company. They met the prices and made money. They even lowered those prices later, because their costs justified it.

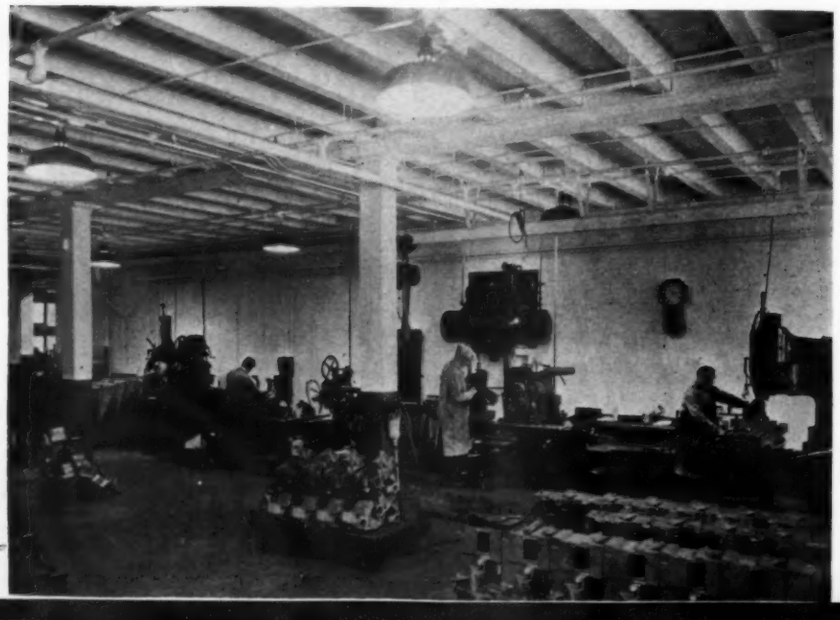
Youngstown experience can be applied to the re-wiring of houses. It can be done in any city where the Re-Wiring Company and the Power Company will work together.

Wiring for FOUNDRIES

Thirteenth in the industrial check list series to help the electrical contractor and plant man design and build up the electrical system to improve conditions and facilitate production.

MOLDING ROOM *in this foundry is flooded with adequate illumination from the mercury vapor units mounted on the roof purlins. Good lighting makes easy the task of packing and pouring molds and results in more accurate castings.*

FINISHING TOUCHES *are applied to castings in this well lighted machine shop. Glass diffusing mercury vapor units provide 30 foot-candles of illumination on the machines.*

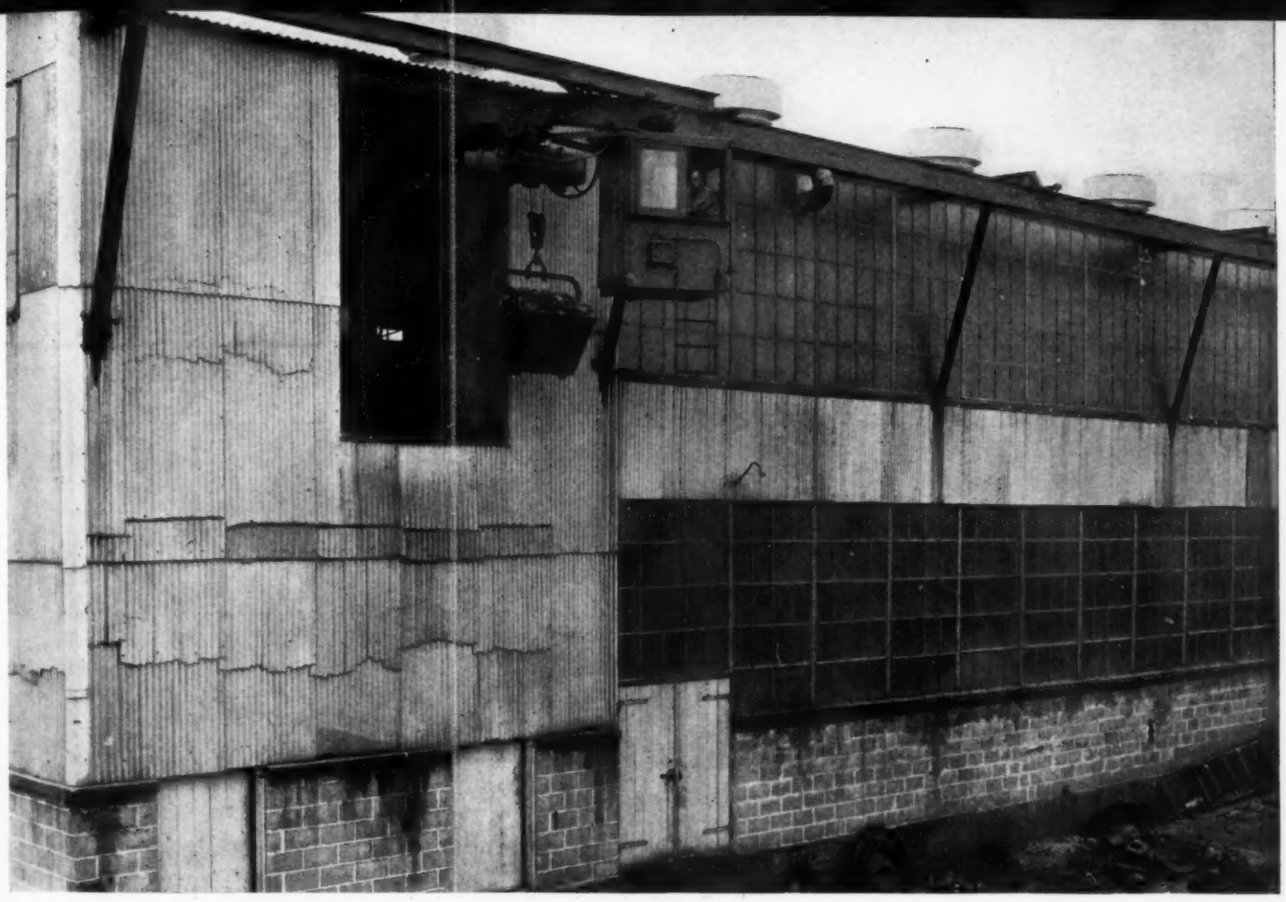


THE foundry forms a strong link in the important chain of metal processing from the mined ore to the finished product. Here, scrap metal, melted and poured into molds, ultimately becomes engine cylinders, machinery bed plates, machine parts, gears and even cooking utensils and plumbing fixtures in our homes. The conduit fittings and switch and equipment enclosures for hazardous locations first took form in a metal foundry.

Although much of the foundry work was formerly done by hand, today machinery has made possible great strides in the progress of this industry. Now, mass production methods can be used to make accurate castings. And what is more, huge castings, never before dreamed of, are being poured today for the production of modern industries' mammoth machines.

While compressed air is used extensively as a motive power for foundry machinery, electricity is finding more and more applications in this industry. Electric motors drive the huge compressors that supply the vast amount of air needed for foundry practice. Grinders, blowers, tumbling mills and cranes are electrically driven. In the larger plants, motor driven sand slingers, mixers and sifters are used. Non-ferrous metals, malleable iron and steel are melted in electric furnaces and castings are annealed in electric ovens.

Then there are the pattern department and machine shop that are an integral part of every foundry. Here, electricity drives the multiplicity of machine tools necessary to put the finishing touches on the castings. A check list of these applications can be found in "What to Remember in a Machine Shop" in the July, 1938 issue



CUPOLA CHARGING. *This three-ton hoist travelling on a monorail is used to charge this cupola with scrap metal from an outdoor pile. Lifting magnets are sometimes used to unload scrap metal from railroad cars to the pile.*

of *Electrical Contracting.* In fact, electric power can be traced throughout the entire foundry process, from the preparation of the sand for the molds to the finished product.

Foundry illumination is of vital importance, especially in the pattern, machine shop and inspection departments. Good illumination in the molding room will turn the molding sand into real "pay dirt" through the production of more accurate castings. And speaking of illumination, under the present defense program, protective lighting should not be neglected. Building exteriors should be well lighted and especially the outdoor scrap metal piles which offer convenient hiding places for destructive objects. Shadowless protective lighting should be the theme. For there is nothing an intruder likes better than shadows.

The accompanying check list presenting the possible applications of electricity in foundry practice, is offered as a guide to the electrical contractor and plant electrician.

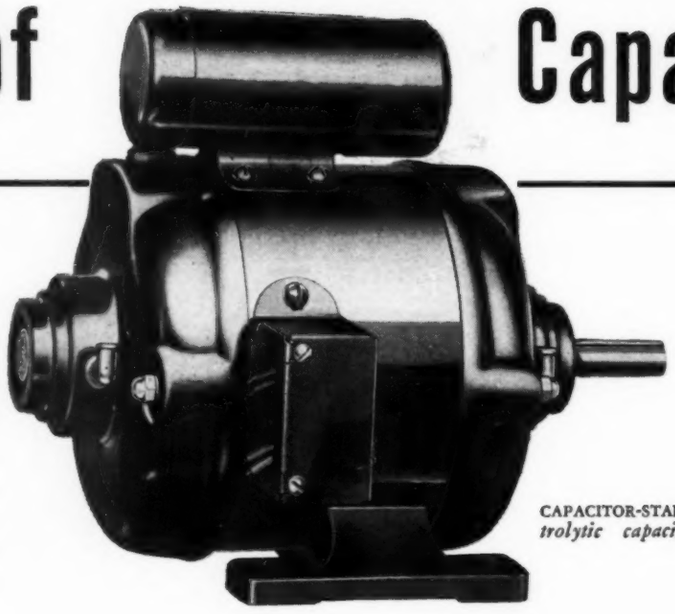
CHECK LIST FOR FOUNDRIES

- Motor Driven Equipment
  - Air Compressors
  - Blenders
  - Blowers
  - Chipping Hammers
  - Conveyors
  - Cranes
  - Cupola Fans
  - Drills
  - Dust Collectors
  - Elevators
  - Fans
  - Forge Blowers
  - Forges
  - Grinders
  - Hammers
  - Hoists
  - Hot Trucks
  - Molding Machines
  - Pumps
  - Rammers
  - Riddles
  - Roll Feeds
  - Sand Elevators
  - Sand Mills
  - Sand Mixers
  - Screens
  - Sifters
  - Skull Crackers
  - Sprue Cutters
  - Steel Saws
  - Storage Battery Charging Sets
  - Tipping Ladles
  - Traveling Cranes
  - Electric Trucks and Locomotives
  - Tumbling Mills
  - Welders
  - Pattern Making Equipment
  - Machine Shop Equipment
- Heating Equipment
  - Annealing Furnaces
  - Brass Furnaces
  - Steel Furnaces
  - Furnaces
  - Core Ovens
  - Glue Pots
  - Metal Melting Pots
  - Molding Machine Heaters
  - Soldering Irons
  - Soldering Pots
- Miscellaneous
  - Lifting Magnets
  - Magnetic Separators
  - Pyrometers
  - Sand Blasts (compressed air)
  - Shot Blasts (compressed air)
- Signal Equipment
  - Bells
  - Burglar Alarm System
  - Code Signals
  - Crane Signals
  - Elevator Signals
  - Emergency Signals
  - Fire Alarm Signals
  - Horns
  - Intercommunicating Telephones
  - Signs
  - Sirens
  - Time Clocks
  - Watchman Clock System
- Illumination Recommendations
  - Molding Floor—General Lighting
  - Inspection—Localized Lighting
  - Pattern Dept.—Localized Lighting
  - Exit Lights
  - Night Lights
  - Dust-tight Fixtures
  - Outdoor Protective Lighting
  - Fence Line Lighting
  - Yard Floodlighting
  - Building Floodlighting

NOTE—The recommended general lighting intensity for charging floor, tumbling, cleaning, pouring and shaking out is at least 5 foot-candles; for rough molding and core making, 10 foot-candles; for fine molding and core making, 20 foot-candles. For inspection work the minimum foot-candle intensities are: rough work, 10; medium work, 20; fine work, 50-100; extra fine work, 100 and above. The intensity for the pattern department should be 50-100 foot-candles. Fences may be lighted with narrow beam projectors inside corner posts with additional projectors every 300 ft. Open floodlights may light sidings and roads, and double range projectors the yard foreground and building sides.

Troubles of Capacitor

By A. F. Puchstein
Robbins & Myers, Inc., Springfield, Mass.



CAPACITOR-START MOTOR *with electrolytic capacitor placed on top*

A description of windings, functions and tests with a chart listing common motor troubles and their symptoms, with suggestions on how to correct them.

CAPACITOR motors are principally applied where a high grade motor is needed. For this reason they are given hard jobs to do. It follows that the service problem is of greater importance if motor trouble does occur at stokers, pumps, conveyors, dairy and bottling machinery, or other important drives. But while used today in large numbers, the history and principles of the capacitor motor are not so commonly known to the trade.

The first capacitor motor patents were taken out about forty years ago by Steinmetz. He also patented the present two-phase type in 1917. Commercial interest on the present scale began about 1929, and since then numerous patents on starting, speed control and other arrangements have been issued. The popular sizes run from ⅛ to ¾ horse power.

The capacitor motor operates as an unbalanced induction motor. Its stator windings and rotor cooperate to set up a more or less perfect revolving field, which drags the rotor around in much the same way as in single and polyphase motors.

Description of Windings

The most common stator windings are the plain, concentric and 2-layer types, arranged in two-phase fashion.

The concentric type has a lower resistance and lower leakage reactance. It requires less copper, giving lower losses and a higher output. But the winding end room and certain slots will be quite full and the two phases will interfere more or less with each other mechanically. The 2-layer type will nest better in this respect.

Generally, turns and wire sizes are different in the two phases. The coils are all alike in shape, however, and may be full or fractional pitch. Three-quarter pitch is good, because it tends to reduce disturbing harmonics. The starting winding in general has larger wire and more turns than does the split-phase motor, which it closely resembles, except for the presence of the capacitor. The rotor is of the ordinary squirrel-cage type. Commonly from 1 to 4 effective microfarads are required per ounce-foot of starting torque in 110-volt 60 cycle motors and ¼ as much in 220-volt motors.

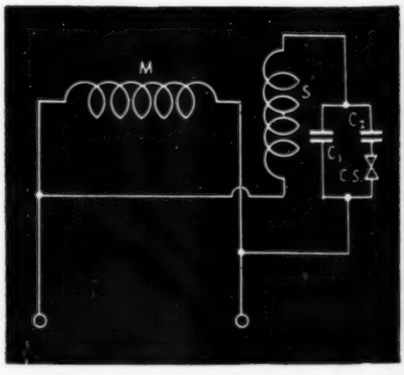
Functions of the Capacitor

In the split-phase motor, the current in the starting winding (S) usually leads that in the main winding. With the capacitor in series with S, the lead and starting torque for a given starting current is greatly increased. With proper capacitance, running performance is greatly improved, while efficiency, power factor and quietness of operation are better, plus reduced vibration.

Transient Effects

Sometimes when a split phase motor is replaced by a capacitor motor, the lights blink more in spite of the lower starting current of the latter. Occasionally capacitor motors show evidence of considerable disturbance when disconnected from the line. This takes the form of marked vibration and noise, with sudden drop in speed. Welding of contacts seems to be somewhat greater than in split-phase motors.

Capacitors must be suitable for the voltage to which they are actually exposed, rather than line voltage. Common voltage ratings are 180, 220, 330, 550, 650, and for the electrolytic type, momentary maxima must not exceed 160 volts (or multiples) as otherwise the insulating gas film will puncture. Cost and bulk increase with voltage rating. The life varies inversely as the fifth power of the voltage. Hence it is im-



STARTING AND RUNNING *capacitors for this motor are used with a centrifugal starting switch.*

Motors

portant not to overstress them, except that no damage is done to paper-oil capacitors by moderate momentary over-voltages.

Capacitor Tests

Paper-Oil and Similar Capacitors: Tests cover such items as constants, performance and checking up rating. Select a test voltage near the figure marked on the can. Conduct life test on rated voltage and accelerated life tests on over-voltage. For insulation-breakdown test between plates and to ground, use a protective resistance to limit current flow after breakdown. There are also insulation resistance tests between plates and to ground, tests to discover effects of temperature and observations for oil leakage. Not all of these tests need be made in any one case.

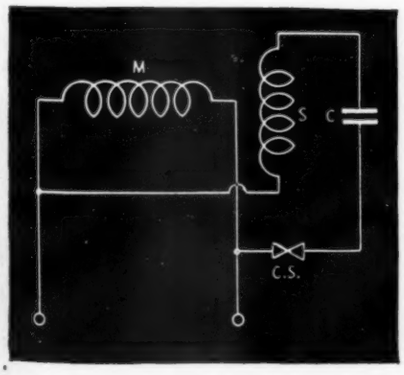
Electrolytic Capacitors: Tests are, in general, similar to those above, except that readings must be taken rapidly. Voltage must be applied intermittently only. While good electrolytic capacitors will stay on the line up to ½ hour, the temperature rise will be rapid. The maximum permissible temperature is about 130° F. Insulation resistance between electrode surfaces is very low, and the can usually serves as one of them. The blow-out voltage is of the order of 160 volts or, when multiple pairs of elements are connected in series, multiples of this figure. This quantity fixes the maximum voltage to which they may be exposed at any time. Examine for evidences of leakage of electrolyte from can. Observe surface temperatures versus time.

Doubtful Capacitors: The above tests will tell the story. See that "C" is up, resistance and loss watts down and insulation resistance in electrolytic capacitors is at a safe value. See that temperature rise and loss watts remain low, or at least that they do not rise too rapidly. See that no puncture exists; apply a momentary over-voltage test if doubtful. Look for bulged can, or an electrolytic type for blown out pressure release.

In diagnosing troubles, it is a help to know what is expected of present day high torque capacitor motors. The tables given in the NEMA Rules or those available from the motor manufacturers, cover: starting torque, pull-up torque, breakdown torque, locked rotor current, efficiency, power factor and apparent efficiency. The accompanying chart lists common motor troubles and symptoms, and how to correct them.

TROUBLE CHART FOR SMALL MOTORS

NATURE OF TROUBLE	SYMPTOMS	METHOD OF LOCATION	REMEDY
Poor or damaged insulation.	Low dielectric strength, low insulation resistance.	Test transformers; d.c. voltmeter whose resistance is known.	Repair, rewind or dry out.
Grounds.	Frame "alive", or current flow between windings.	Test transformers.	Reinsulate fault or rewind.
Opens.	Winding refuses to take current.	Inspect soldered joints, switch and relay contacts.	Resolder, weld or rewind.
Shorted turns.	Hot spots, increased heat and current.	Find local hot spots.	Reinsulate or rewind.
Unsoldered, loose or broken rotor bars.	Low torque and primary current, noise, thrown solder.	Inspection, locked and running brake test.	Resolder, reweld or replace rotor.
Wrong rotor resistance.	Excessive starting torque, low locked current, under speed.	Compare motor specifications with test results.	Rebuild, alter or replace rotor.
Crawling, hooks, saddles or dips.	Motor may not start or runs slow, excessive current and heating.	Test with specifications.	Correct at factory.
Wrong capacitance.	Wrong starting or pull-out torque; noise, excessive losses, heating at light loads.	Note starting torque and losses at light loads. Compare capacitance with specifications.	Substitute the correct capacitance.
Welded contacts.	Centrifugal switch does not function, when motor stops or starts.	Inspect starting arrangements, heating and behavior.	Free contacts, redress or replace.
Low starting torque.	Low starting torque.	Brake test.	Check capacitance, voltage, connections, look for faults.
Faulty switch, sticking, chattering, wrong switch speed.	Noise, poor starting. Dirt, rust, corrosion. Warped, bent or damaged parts.	Observe speed at which switch operates.	Adjust, clean and free or replace parts.
See-sawing (particularly fans and oil burners.)	Motor starts, speed falls, increases again; repeated switch action.	Observation.	Larger motor or change switch speed.
Defective or wrong transformer, wrong connection.	Fails to start.	Check turn-ratio, taps, design; saturation of transformer core.	Correct according to trouble.
Noise and vibration.	Punchings, loose or not sufficiently tight.	Observation, noise meter, vibration meter.	Check gaps, concentricity, skew and slot, winding, loose wires or parts, lubrication.
Wrong winding connection or wrong voltage windings.	Weak torques and small currents or else high current and heating.	Compare actual and rated d.c. resistance, voltages, currents and torques	Correct what is found.



CONNECTIONS *for one make of two-phase type, centrifugal switch capacitor-start motor.*

LUMINOUS RAIL—*Etched solid Lucite handrail on the stairway and mezzanine made luminous by concealed fluorescent sign tubing located in a glassed-in panel beneath. This also sheds light on the stairs themselves. Ceiling cove of main lobby is also to be seen.*

TRANSLUCENT MAP—*General lighting is from the coves around the room. Mezzanine troughs at the rear light that area. Unique lighting feature is the Lucite map on the display board lighted from three rows of lamps.*

LIGHT
Makes This Salesroom

Interesting deluxe application of fluorescent lighting in Union Pacific Ticket Office in San Francisco—Ultra modern effects.

"MAKE it as modern as the streamlined trains" the Union Pacific Co. told Victor Lemoge, San Francisco electrical contractor. It wanted its new ticket office, at the corner of Powell and Geary Sts., to be lighted with fluorescence throughout. Working closely with Williams & Grimes, architects, and Robert Prussia, fixture designer, Lemoge fitted the coves provided by the architects at the ceilng line with a bank of three 48-in., 3,500-deg. Kelvin, white tubes. At bends or corners where angle was too sharp 30-in. and some 24-in. lamps were used. The result is a uniform indirect illumination of about 25 foot-candles at the counter and desks.

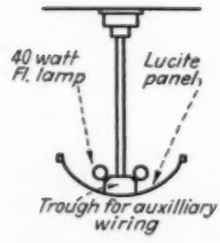
Fluorescent lighting was used also on the second floor office in inverted luminous coves employing 48-in. fluorescent lamps in pairs along a continuous fixture. One fixture was 38 ft. long, the other 46. Private offices had shorter sections of the same design. The fixture contains the ballast.

For a low ceiling mezzanine a rolled edge cove was inset in the plaster. Behind each rolled edge was a 30-watt concealed fluorescent lamp.

Fluorescent sign tubing was used to light from underneath the stair rail made of solid Lucite and etched. It was also used behind a map made of Lucite and inlaid in the decorative back wall to the counter area. On a color sign control, alternate sections of the map are lighted up in synchronism with the lettering at each side describing the various trains run by this railroad.

Basement areas and even washrooms were lighted with fluorescent fixtures of the bare lamp commercial type. The only incandescent lighting in the premises were 150-watt mazda lamps on 1-ft. centers in a louvered ceiling trough window fixture, in order to get sufficient light in the narrow space.

The total load of 375 amperes is carried on a 400-ampere new main circuit breaker switchboard. This main panel in the basement also serves an outside sign and two subpanels of circuit breakers for the interior lighting. Interior lighting is on six circuits of 1,350 watts, a total of 8,100 watts, plus 1,650 watts of circuits for the window reflectors. A total of 14—15-watt, 31—20-watt, 70—30-watt and 157—40-watt fluorescent lamps are used in the two floors and basement.



SUSPENDED COVE—*Cross-section of second floor cove for fluorescent lamps.*

INSET EQUIPMENT—*Cross-section of inset cove in the mezzanine ceiling.*

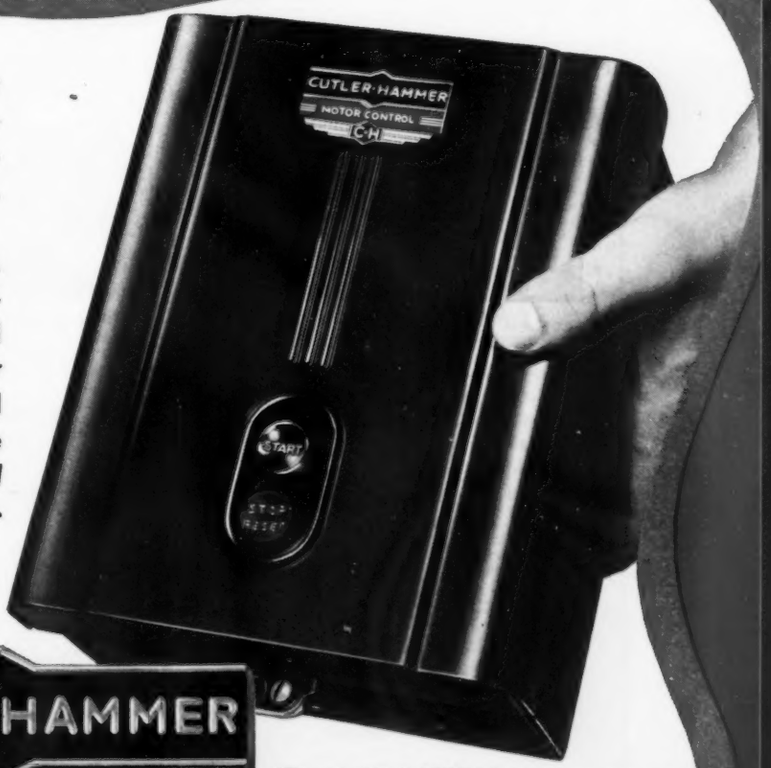
WORK SPACE—*Twenty-five foot-candles of illumination in this office from suspended units with double rows of 40-watt fluorescent lamps in a continuous inverted cove with Lucite translucent sides.*

INSTALLATION TECHNIQUE. *Rail trough (left) under balcony houses fluorescent tubing for rail lighting. Transformers are in a closet under stairs. Ceiling cove (right) contains three rows of lamps.*

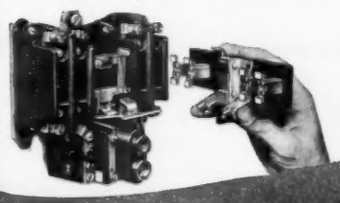
Doesn't It Beat All How DIRTY *Things Get!*

THE annual spring cleaning which is a bane in every housewife's life, is mute testimony to a fact of far-reaching significance to factory executives and maintenance men. *Dust is everywhere, gets in everywhere, and settles on horizontal surfaces.*

Dust is a destroyer where Motor Control is concerned. Dirty contacts mean trouble. Horizontal contacts collect dust. Vertical contacts stay clean. So, experienced and profit-minded factory men insist on Cutler-Hammer Motor Control . . . the control with dust-safe Vertical contacts. You too insist on Cutler-Hammer, and see the difference. CUTLER-HAMMER, Inc., *Pioneer Electrical Manufacturers,* 1306 St. Paul Avenue, Milwaukee, Wis.



Cutler-Hammer *Vertical* Contacts are the mark of *better* Motor Control, another extra dividend on Cutler-Hammer's unequalled specialized experience and decades of Motor Control leadership.



CUTLER-HAMMER
MOTOR CONTROL
C-H

Dust Safe VERTICAL *Contacts*

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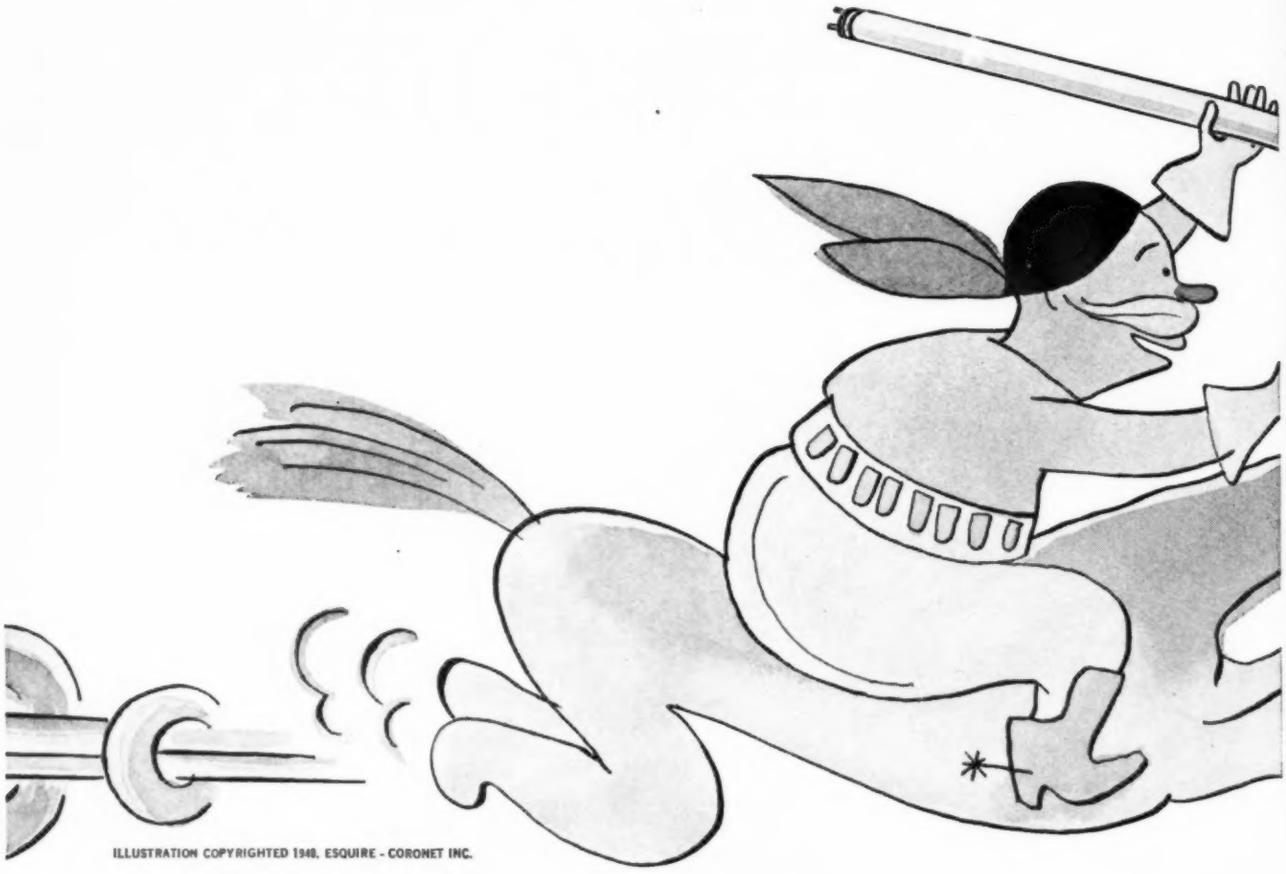
HOW YOU CAN SELL MORE



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FROM THE TINY 6 WATT TO THE GIANT 100 WATT *there's a complete line of* G-E MAZDA F *lamps.*

FLEUR-O-LIER
"SPECIFICATIONS FOR LUMINAIRES, FITTINGS AND AUXILIARIES FOR FLUORESCENT LAMPS"
ETL
THIS CERTIFICATION IS CONTINGENT UPON EMPLOYMENT OF CERTIFIED AUXILIARIES OF OVER 85% POWER FACTOR

G-E MAZDA "F" LAMPS *are recommended for use only with equipment providing good power factor, such as Fleur-O-Liers or RLM Industrial fixtures. The label shown here identifies Fleur-O-Lier fixtures, made by more than 40 experienced manufacturers.*

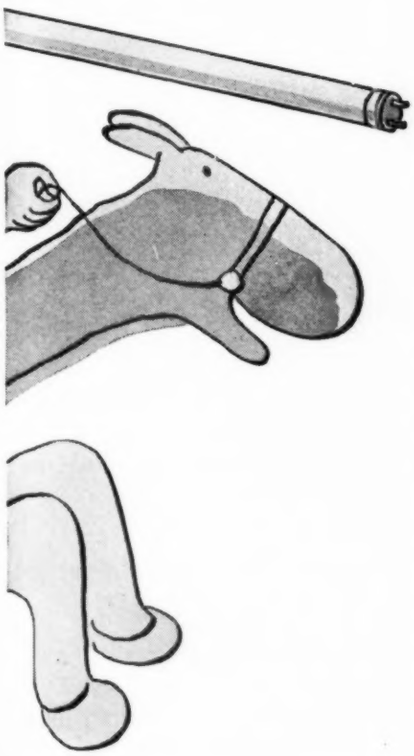
PUGH BROTHERS' JEWELRY STORE in Youngstown, Ohio, uses G-E MAZDA F lamps to get 70 to 80 footcandles of light on the counter tops.

THE ENGINEERING AND PRODUCTION office of the All-Steel Equip Company, Aurora, Ill., has 60 footcandles of light from G-E MAZDA F lamps.

IN PANGLE'S MASTER MARKET, Lima, Ohio, G-E MAZDA F lamps in fluorescent luminaires provide adequate light for selling fruit and vegetables.

IN THE J. L. HUDSON COMPANY, Detroit, G-E MAZDA F lamps, lighting these display niches, provide 50 to 75 footcandles of light.

50* FOOTCANDLE JOBS . . .



Satisfy more customers and make more profit in 1941 by selling

G-E FLUORESCENT LIGHTING!

OUTDOORS on a sunshiny day, the light in the shade of a tree may be between 200 and 1000 footcandles. That's "ideal" lighting. And that's why science says that even 50 footcandles of light is not enough for critical seeing. We need all the light we can get. From a practical standpoint, however, it is not yet possible to have scientifically "ideal" artificial lighting indoors.

But compared with most lighting installations, 50 footcandles is a long step in the right direction—and it is easily obtainable with modern light sources and suitable equipment.

Selling 50 footcandle installations is not hard . . . when you use some of the Science of Seeing facts and point out the benefits such lighting offers. Show your customers that good light means better production, or better sales, because it—

1. *Makes seeing easier, faster, more accurate.*
2. *Increases efficiency and reduces fatigue.*
3. *Reduces accidents.*
4. *Conserves eyesight.*
5. *Improves morale of employees because of brighter, more cheerful working conditions.*

Raise the question with your customers whether it is worth while remodeling to get 10 or 15 footcandles when for a little extra you can give them 50 footcandles? In short, your customers will be better satisfied with 50 footcandle installations, and you'll make more profit yourself by selling the necessary new equipment and the new light sources.

WHY SELL G-E FLUORESCENT LIGHTING?

Today G-E fluorescent lighting, or a combination of fluorescent and filament lighting, offers an effective means for obtaining 50 footcandle levels. G-E fluorescent lighting is easy to sell. Here's why:

1. Forty-two years of G-E advertising has created a consumer preference for G-E lamps. Today G-E advertising is creating more and more customers for G-E MAZDA F lamps. *To make them easier to sell.*

2. Since G-E MAZDA F lamps were introduced in 1938, efficiency has been increased as much as 40% and prices reduced as much as 45%. Today's G-E MAZDA F lamps are made to give maximum light output for current consumed *—made to stay brighter longer. That's a sales point to use.*

3. General Electric cooperates with many fixture manufacturers, and does not make fixtures itself. You can offer your customers a wide variety of individual styles and types to fit every business. General Electric recommends Fleur-O-Lier or RLM fixtures which are certified by Electrical Testing Laboratories to comply with exacting specifications to assure maximum performance.

4. Experienced lighting engineers, averaging 16 years service with General Electric are available through G.E.'s strategically located sales offices to offer help and advice on G-E Fluorescent lighting.

5. Your local General Electric Lamp Sales Division Office is ready to supply you with fluorescent lamp literature and help in preparing a direct mail campaign to stores, factories, offices and others of your business prospects. Get in touch with them today. General Electric Company, Nela Park, Cleveland, Ohio.

Before you sell any type of FLUORESCENT LIGHTING ask yourself these questions:

1. Are you offering a wide enough choice of fixtures so that you can meet your customers' INDIVIDUAL needs?

2. Is the performance of the fixtures and ballasts and starters certified for best lighting results by Electrical Testing Laboratories?

3. Are you selling G-E MAZDA Fluorescent lamps, which give all the efficiencies and economies of MAZDA Research?

**Watch for the "Forty-niners" . . . to be announced soon.*

G-E MAZDA LAMPS
GENERAL ELECTRIC

Made to stay brighter longer

Earl Whitehorne, Editor

Step Out

America is marching as to war. Whether or not we will ultimately be thrown into the fighting, we are already marshalling men. And we are manufacturing the things that make war, as we have done only once before. Munitions today dominate the American scene.

For those of us who are beyond the age for personal military service, responsibility centers round guns and shells, airplanes and tanks, and ships, clothing and food. And the question is what can *we* do? The answer is fortunately very plain. We can help speed production—we electrical contractors, we plant electrical engineers, we motor shops—and that is an important job. It is a part that we alone can play.

For reasons of patriotism and pride as well as profit, no one of us should falter. Go at once to the factories in your town and offer your services. They need more electric power, more light, more heating, welding, ventilation, more capacity. We should not wait to be called. We should step out and help.

This Power Industry

Study of *Electrical World's* annual statistical review shows some interesting things about the power industry. Last year the power companies experienced their largest annual increase in output, a rapid rise in industrial consumption of energy, greatly increased use of generating capacity, record breaking commitments for additional capacity and a larger increase in substation construction.

Rates are lower. Operating costs and taxes are higher. But the cost of money—interest rates—are down. So the business has made a "fair return." And the industry appears to have sufficient load carrying capacity to take care of all defense requirements. In a word, a good outlook.

Electrical Manufacturing

January reports for the electrical manufacturing companies build up into this picture. Sales of electrical apparatus showed total sales last year 25.2 per cent larger than 1939. This was slightly below the peak of 1929.

Bookings of orders in the third quarter were the largest in history by 50 per cent. The fourth quarter—not yet available—was probably larger. Much of this equipment and material will be delivered and installed this year. It will mean more work for the electrical contractor and the industrial plant staffs in factories and commercial buildings.

Let's Be Honest About It

Electrical men have been brought up to feel that electricity is safe and everything electrical is modern and the best. This is no longer true. It is time we all began pointing out where installations are unsafe and equipment is obsolete.

The first idea was not to frighten the public. But if they are not afraid to drive automobiles that kill maybe 100 persons every day, people will not quit using electricity, now. We need not be afraid. So let's go after the outworn, out-grown wiring in town and show it up. There is a lot of business waiting here.

The Leagues

Electrical leagues, in our leading cities throughout the country, are doing a valuable work. Gradually the five branches of the local electrical industry have come to recognize the need for coordination, and the league has been accepted as the logical medium for such endeavor.

But though the principle is generally accepted today, what of the practice? Unfortunately, it still lags. And the reason appears to be that most electrical men look upon the league as an agency for handling cooperative promotion activities and fail to utilize it for industry self-government. But nevertheless there lies its greatest opportunity for service.

Trade relations in most communities are not too happy. Economic problems and the ethical principles upon which they hang, cry out for attention. Leaders are needed who will step out and say—"Let's straighten this out!"—and then go forward. And the leagues can provide them.

We all owe much to the league managers. They have struggled valiantly to keep the leagues going ahead. They have made a real contribution. And their organizations should be utilized for broader programs for progress.

Labor Cost Headed Up

While contractors report a shortage of skilled labor, unions report mechanics on their lists still unemployed. And both are right. The first class men are all busy. The second grade men, the trouble makers and the soldiers are not. Contractors don't want them. But the union won't take new cards until these men are at work.

Jobs being figured today will have to be done with whatever labor we get. And this is certain—it won't be top grade. Without extensive application of power driven tools and new methods, we are bound to face a rapid increase in labor hour units.

Five or six years ago, labor efficiency factors of .85 were common. In 1940 some estimators were already using a 1.05 multiplier on standard units. It is safe to predict that some jobs this year will require 30 or 40 per cent more estimated labor hours for the labor that will be available.

Know Your Lamps

Some fifty million incandescent lamps are manufactured yearly. Present production of fluorescent lamps is at the rate of five million annually. But you would never think it, as you overhear the discussion of lighting these days. For the new tubes have run away with the show.

Will fluorescent lamps someday replace incandescent lamps completely? Probably not. The new illuminant undoubtedly will continue to gain an increasing share of the market, but in the end each will have its field of economic usefulness. The problem of the contractor now is to understand the new lamp and to apply it intelligently and to sell it wisely.

The customer, too, should see clearly how the fluorescent tube operates. Why the auxiliary equipment and what are its advantages? And to do this the seller must be sure in all details.

Better Than Mind Changers

Industrial electrical contractors and plant electrical engineers will have to make some tough decisions this year —and next. The question will constantly be coming up—Is it better to patch up the old equipment, the old wiring system, or replace it with new? The wise man will face the whole problem at the outset and not just deal with the day's expediency.

Such factors as space saving, ease of installation, economy of maintenance, safety, dependability and reserve capacity will all be basic in importance. They bear on every type of major equipment. And the most efficient way to deal with the whole problem is to make a thorough study of the system and set a policy. It will cost less than mind-changing and be far safer.

Plus Volume— Do You Want It?

The business of the electrical contractor is to sell and install electrical equipment—but he is not restricted to a voltage of 110 or over. You might think so, however, when you consider how little attention is given today by many contractors to signal wiring.

There is a vast line of modern equipment for signalling. There is an awakening realization in industry that signals save steps. There is a new market for protection in plants working on war materials. The need for a two-way telephone to the front door of every house and apartment in the land to save the housewife time, convenience and safety. And yet a lot of us howl about there being no business!

Here is a specialty, if you need one. Here is plus volume on every installation job. It's just your move.

Delayed Deliveries

Manufacturers of many products are already having volume troubles. Delayed deliveries are becoming more prevalent. Let the buyer beware. It is only beginning and must be figured into installation design as well as performance promises.

Your policy on stocking regular materials and equipment may have to be considerably revised this year. Your contact with the wholesalers and manufacturers may have to be closer. Your planning may have to reach further ahead.

Back Talk

Buy Unwired Fixtures

To the Editor—"Referring to the editorial in November, the economics of the problem are all in favor of what you have advocated. The user will get an installation at lower cost. The electrical contractors will be resuming their function and make more money doing so. The electrical wholesaler will carry the stocks of F lamps, lamp holders, starter sockets, FS starters, ballasts, capacitors. From the fixture manufacturer they will obtain the 'chassis'. The electrical contractor will assemble and wire all this equipment properly selected.

"One of the reasons most manufacturers are supplying the completely wired fluorescent unit has been the preference for 'package' units. Additionally there has been some disposition on the part of inspection authorities to insist upon factory wired and labeled fixtures. Admittedly, inspection is easier at the factory and relieves the field inspector of the detailed inspection of individual units on the job. The Underwriters' label on the fixture he accepts as sufficient evidence of safe construction.

"While the aim of your editorial in time should be achieved, right now this whole fluorescent lighting business is in such a state of flux that for some time to come, fluorescent lighting fixtures fully equipped and wired will be demanded by the electrical trade, both wholesale and retail. However, I am glad that the 'voice in the wilderness' has been sounded. That is an auspicious start."

John A. Hoeveler
First Vice President
Pittsburgh Reflector Company

An interesting opinion, Mr. Hoeveler, and thank you. We agree with you that the wiring will probably continue to be done at the factory. It is easier and ease usually exerts a stronger pull than a small extra profit.

Average Lighting Levels

To the Editor—"There is one point which we would like to bring to your attention which appears to be common to many articles on fluorescent lighting—that is the failure to distinguish between pre-initial, initial and average maintained foot-candle levels. Well informed and ethically minded lighting engineers have always referred to 'maintained in service' levels in discussing the foot-candles provided by a specific installation. Whereas most of the articles about fluorescent lighting obviously refer to initial or even pre-initial levels, that is levels secured before the 100 hour seasoning period is over.

"Such figures tend to mislead contractor and customer alike as to results from a particular installation and also distort comparisons with incandescent equipment, which invariably is tested in a highly depreciated stage. Illuminating engineers know that depreciated levels average from 50 to 75 per cent of initial levels and the use of references to initial levels without so defining them can only result in confusion to the trade and the public. Let's have proper definition for these terms and an acknowledgement of the depreciation expected where initial levels are referred to."

L. B. Paist, Supervisor
Lighting Department
Northern States Power Co.

You make a good point, Mr. Paist, and one that is generally disregarded. We will endeavor to have this factor reckoned into future comparisons of light levels. But it won't be easy. The seller wants to show how good the new light is and the tests are made when the light is first turned on—not later when the true level of lighting has been reached.

The Fluorescent Tangle

To the Editor—"Distribution of electrical appliances, wiring materials and particularly fluorescent lighting equipment, is driving everyone nuts. There are many manufacturers of fluorescent equipment who are well established. To give all of these distribution in any one market is practically impossible. Then there are local manufacturers who sell in competition with those who have national distribution. We have three in this area, and they seem to prefer to sell through other channels, or direct to the user.

"The net result is that you can purchase fluorescent fixtures at or below the contractor's normal cost from your regular supply sources. The grocer may buy from his wholesale grocery house, the druggist from his drug supply house. The fixtures which they get have standard sockets, starters, capicators, lamps.

"The much heralded opportunity for fluorescent equipment with an incidental profit, is one of the industry's biggest headaches. The electrical contractor is being bowed out of the picture. He is actually accused of obstructing sales because these fixtures must be wired for, or at least installed, and the cost of this work is cramping the style of those who sell direct to consumers at wholesale prices.

"What to do? I don't know. Perhaps some day manufacturers in order to assure customers of real service, value and satisfaction, will see that their products are sold and installed only by properly trained, well equipped, dependable electrical contractors."

William A. Ritt
Secretary-Manager
Minnesota Electrical Council, Inc.

There is only one cure that we can see. The electrical contractor, wholesaler and power company must sell the local public on the need for proper installation by a responsible contractor, if good lighting is to be secured. When this vital fact is accepted the grocer and druggist will call in his contractor and not take a chance on buying lighting from anybody else.

WIRING Methods

DRILL EXTENSION

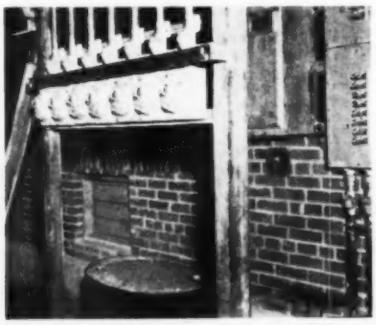
Contractors who do work in existing houses are often faced with the problem of drilling through wood studs and horizontal supports concealed in building walls several feet from a point of access.

J. S. Fisher, electrical contractor of Danbury, Conn., has solved this problem by making a set of ¾-inch gas pipe extensions, each approximately 30-inches in length. The shaft of the auger bit is cut and one of the extensions welded to the cutting end, the other to the shank which fits into the brace. Intermediate extensions are coupled to these two and made up tight with two wrenches.

By using this piece of equipment, Mr. Fisher has been able to drill holes five to six feet away from the access point.

EMERGENCY CONTROL

Emergency control in case of accident is always advisable, especially so when machinery is located in hazardous atmospheres. Taking every possible precaution to insure safety in case of emergency, The M. W. Kellogg Co., New York, oil refinery contractors and engineers, installed this set of stop buttons outside the door leading to the control room and underneath the stairs leading to the roof of an oil cracking plant.



***OUTDOOR CONTROL** permits shutdown only of motors inside this oil cracking plant. Rack is located adjacent to the control room exit, so anyone entering or leaving the building in case of emergency can stop the motors.*

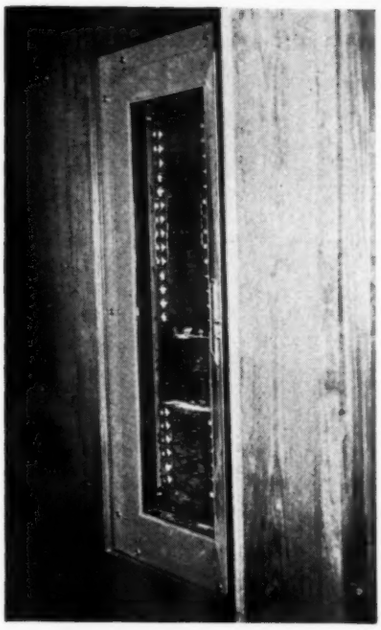
These vapor-proof push button stations are mounted on an angle iron rack and are connected to the control of the various pump motors in the building. Conduit sealing fittings, inserted in the control circuit above the buttons, confine any arcing that may occur to the push button enclosure. All conduits are grounded by a continuous copper strap which is connected to the buried ground network. The equipment designation for each control button is stamped on the flat strip of metal mounted on the rack above the buttons.

Thus, the first person out of or near the building during an emergency can press the buttons and stop the operation of the equipment in the building. The equipment can be started again only by operating the control button at the motor.

AUTOMATIC LIGHTING CONTROL

Automatic control of show window lighting is practically a necessity in the modern store, especially in the large commercial establishments where it requires considerable time to go around and turn on and off all the lights in the numerous show windows.

To make the show window lighting circuits in a large store independent of manual control, the Lord Electric Co., New York City, divided the lighting panel in two sections and installed a magnetic relay switch controlling that section of the panel operating the show window lights. This magnetic switch was controlled by a time switch located in a separate compartment adjacent to the lighting panel. So, at a predetermined time all the window lights were automatically turned on and after a predetermined interval were automatically turned off.

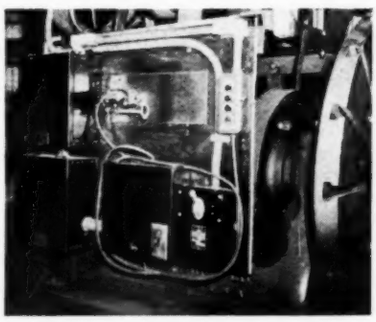


***AUTOMATIC SWITCH,** operated by a time switch, divides this lighting panel and turns on or off all the lighting circuits mounted above it. These particular circuits are for the lighting in several show windows.*

This same system was used on several sales floors to control sections of the general lighting. Only, here, instead of being operated by a time switch, the lights were manually controlled from a central point remote from the lighting panel.

LATHE CONTROL PANEL

In order to get a variety of speeds, both forward and reverse, the Electrical Engineering and Service, Inc., Westfield, Mass., designed and built a control panel on the front of their large lathe. The lathe is driven by a 10 h.p. across-the-line squirrel-cage motor with a short center V-belt drive



***CONVENIENT CONTROL** on this large lathe saves time and money on repair jobs. Ten different speeds forward or reverse and a remote jog control are available.*

HAZARD offers a COMPLETE LINE for ADEQUATE WIRING

ADEQUATE WIRING SERVES AND SAVES

HAZARD ABN AND UBN SERVICE ENTRANCE CABLES

Adequate wiring must begin with an adequate service entrance cable.

HAZARD FIREKROME BUILDING WIRE

1940 Code classifications for which Hazard Building Wire is manufactured includes Types R, RL, RP, RPL, RPT, RW, RH, for regular wiring jobs. Each of the 4 grades of insulation possess qualities which exceed the code requirements by a safe margin.

SMALL DIAMETER WIRES

Hazakrome Type SN and Performite RHT meet all requirements of the 1940 National Electrical Code for small diameter wires. Through their use it is possible to greatly increase the capacity of existing raceways. *Note:* Type RHT may be used for both new work and rewiring.

PERMEX LAMP CORD

An adequate cord for floor lamps, table lamps, radios, electric clocks, etc. A rubber sheathed, parallel lamp cord that is safe.

HAZARDEX NON-METALLIC SHEATHED CABLE

An adequate cable for interior wiring jobs. A new Hazard product, standard in construction and fully approved.

HAZARD FLEXIBLE STEEL CONDUIT

For adequate protection on short runs or where many bends must be made.

HAZARD WATERTITE WIRE

For adequate wiring in moist places. Replaces lead encased cable. Approved by Underwriters Laboratory per Sec. 3035 National Electric Code.

HAZARD ARMORED CABLE

For adequate wiring on remodeling jobs use the cable with rip-cord for easy working and with flame-resisting, moisture-proof paper sheath between conductor and armor.

FROM BUILDING WIRE TO POWER CABLES

Hazard Engineers are always ready to consult with you on wiring problems. Call our nearest branch or write direct to

HAZARD INSULATED WIRE WORKS

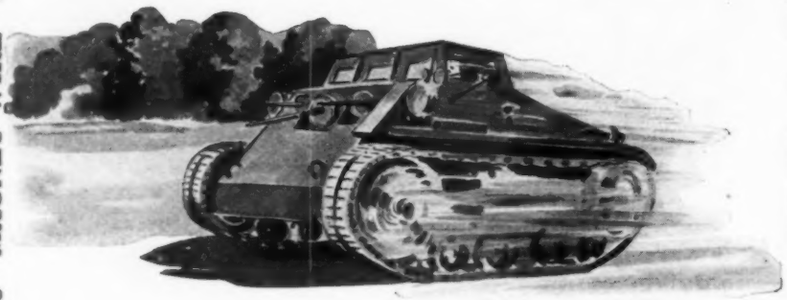
DIVISION OF THE OKONITE CO.
WILKES-BARRE, PENNSYLVANIA
Offices in principal cities

A complete line, stocked by Electrical Jobbers

HAZARD INSULATED WIRES AND CABLES

RUBBER COVERED POWER CABLES • BUILDING WIRE • BARE WIRE • MAGNET WIRE • SERVICE ENTRANCE CABLE • NON-METALLIC SHEATHED CABLE • CRESFLEX • ARMORED CABLE • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • VARNISHED CAMBRIC

INDUSTRY SPEEDS DEFENSE



with much of the POWER supplied by

CRESCENT CABLES

With increasing power needs threatening existing load capacities, look to CRESCENT'S comprehensive line of cables, a few of which are:

- RUBBER POWER CABLES
- SIGNAL CABLES
- CONTROL CABLES
- VARNISHED CAMBRIC CABLES
- PORTABLE CABLES
- PARKWAY CABLES
- BUILDING WIRE AND CABLE

CRESCENT INSULATED WIRE & CABLE CO.

Ask Your Electrical Wholesaler For

CRESCENT WIRE and CABLE

Factory: TRENTON, N. J.—*Stocks in Principal Cities*

CRESCENT ENDURITE SUPER • AGING INSULATION

WIRING Methods

[FROM PAGE 30]

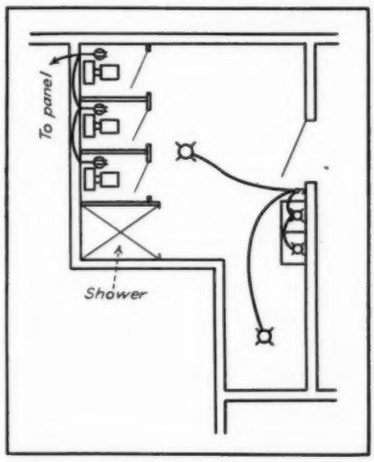
utilizing seven belts. Flat belts are used on step pulleys for speed changes.

The control panel consists of a main line front-operated switch; two magnetic switches mechanically interlocked, one for forward and one for reverse motion; a push button station with forward, jog, reverse and stop positions; a small switch for forward and reverse on the jog position; and a foot operated pedal for controlling the lathe when operating on the jog station. All of these switches and controls are mounted on a wood board fastened to an iron framework on the front of the lathe. The foot pedal is connected to the control panel by a long length of heavy duty rubber covered cord so it can be placed on the floor anywhere along the front of the lathe bed at a convenient point for the operator wherever he may be standing. A small bracket fits over the push button station and holds the jog button in when the foot pedal is being used.

STERILAMP OUTLETS

In the wash rooms of a Chicago bowling alley the Gould Electric Company installed a row of plug receptacle outlets at a height of 18 inches behind the plumbing fixtures to allow connection of new sterilizing equipment.

The sterilizer works automatically.



STERILIZING EQUIPMENT required this outlet layout in bowling alley wash rooms.

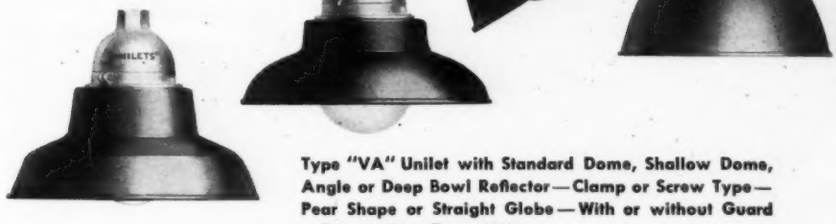
A light spring on the seat hinge pulls it up and back into a metal case when released. A trip switch actuates a "sterilamp" flooding the seat with germicidal rays. A waterproof heavy duty cord connects the equipment to the adjoining outlet. The load is approximately 20 watts.

Hundreds of Vaportight Lighting Combinations

FROM *One* APPLETON UNILET

TYPE "VA" UNILET

Type "VA" Unilet with Clamp or Screw Type Guard — Form 100 or Form 200



Type "VA" Unilet with Standard Dome, Shallow Dome, Angle or Deep Bowl Reflector — Clamp or Screw Type — Pear Shape or Straight Globe — With or without Guard —Form 100 or Form 200

12 Other Types in This Same "V" Series

—*All With the Same Amazing Versatility*

"V" Series offers an excellent illustration of the completeness — the flexibility — of the Appleton line! Thirteen distinct types, all *vaportight* and heavily cadmium coated, each in three sizes, and each quickly adaptable to clamp or screw-type guards or reflectors in either Form 100 or Form 200 accessories.

And that isn't all! Every "V" Series convertible lighting fixture is furnished with receptacle and with or without lamp grip. All may be ordered with standard clear glass straight globes, or in any of seven colors, including light red, made in accordance with U. S. Government Standards for aviation use. Pear-shape globes are plain or Pyrex and shatterproof globes and Fresnel lenses are available for special installations. See Section 5 of the Appleton catalog binder.

You will have the *right* conduit fitting for every job if you standardize on Appleton products—STANDARD FOR BETTER WIRING!

APPLETON ELECTRIC - PRODUCTS - REG. U.S. PAT. OFF.

The name "Appleton;" the registered trade-mark, "Unilets;" or the famous circle-A Appleton trade-mark shown above, appears on every Appleton fitting. *We manufacture no private brand goods!*

APPLETON ELECTRIC COMPANY
1704 WELLINGTON AVENUE CHICAGO, ILLINOIS

Branch Offices: NEW YORK, 76 Ninth Avenue • DETROIT, 7310 Woodward Avenue • CLEVELAND, Keith Building • SAN FRANCISCO, 655 Minna Street • ST. LOUIS, 420 Frisco Bldg. • LOS ANGELES, 100 North Santa Fe Avenue • ATLANTA, 203 Luckie Street, N. W. MINNEAPOLIS, 305 Fifth Street, S.

Resident Representatives: Baltimore, Birmingham, Boston, Cincinnati, Dallas, Denver, Kansas City, Milwaukee, New Haven, New Orleans, Philadelphia, Pittsburgh, Seattle

SOLD THROUGH WHOLESALERS

APPLETON

Conduit Fittings • Outlet and Switch Boxes • Explosion-Proof Fittings • Reelites

WE BROKE WITH TRADITION...

TRI CLAD INDUCTION MOTOR

Gives extra protection 3 ways

1 *Extra Protection*

AGAINST PHYSICAL DAMAGE

One-piece cast-iron frame and cast-iron end shields protect the vital parts — from external blows, falling objects, or dripping liquids—keep them safe and secure even under slam-bang conditions. The entire stator frame, including integrally cast feet, is built to give all-round strength without excess weight.

BUILT FOR PROTECTION FIRST . . . TO LAST

...TO BUILD THIS NEW MOTOR

2 Extra Protection AGAINST ELECTRICAL BREAKDOWN

Stator winding of Formex* wire—the toughest magnet wire ever developed—gives extra protection against moisture, oil, abrasion, and heat-aging. New synthetic-resin bonding varnish and Glyptal No. 1201 Red on end windings make a sturdy unit with a durable finish. You get a motor you can count on for continuous service year after year.

*Reg. U.S. Pat. Off.

3 Extra Protection AGAINST OPERATING WEAR AND TEAR

Sleeve bearings are of new design —have a scientifically determined length and diameter and a method of grooving that assures a continuous oil film over the entire bearing surface. A new and simple ball-bearing mounting assures correct alignment and exclusion of foreign materials—bearings can be cleaned and greased without disassembling.

OUR field studies had shown that, more and more, the requirements of industry were demanding a vastly improved general-purpose motor, and it was apparent that this demanded a radically new approach on the part of the designer. Similarly, design studies showed that only by making a fresh start could full advantage be taken of the materials and methods that were newly available. Only by matching up *all* the new wants and *all* the new ways of doing things, in a supreme effort to make a *long jump* ahead—instead of the traditional *step* ahead—was it possible to achieve the truly modern motor you asked for.

And now you have the Tri-Clad motor—a completely new design. More than 15 important improvements have been built into it. And for the reason that so many major improvements were concentrated in one design, we had to have just that much more assurance that each one was thoroughly practical. Never before, we believe, has the manufacturer required a motor to prove itself so thoroughly in advance of initial sale.

Whatever the task you have for a general-purpose motor —whatever your special concern for appearance, convenience, quietness, *or* protection—you will find that the performance-tested features of the Tri-Clad motor will give you specific benefits on the job. General Electric, Schenectady, N. Y.

1, 1½, 2, 3, and 5 hp now available—
larger sizes will soon be ready

GENERAL ELECTRIC

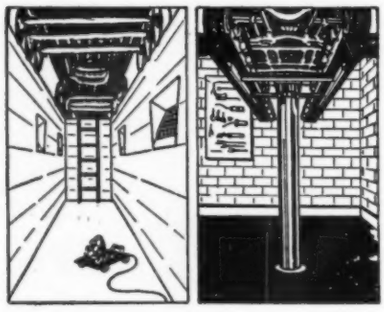
730-37

Better Lighting

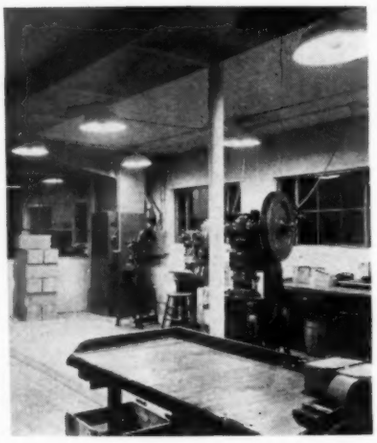
TO HELP LIBRARIANS—Lighting a library in which the ceiling is ornamented with heavy beams and colored plaster, is always a difficult problem. At the Mission Hill Grammar School, in Santa Cruz, a very satisfactory lighting of 25 ft.-candles on the table tops was accomplished by installation of eight 300-watt ceiling boxes equipped with 12-in. Holophane control lens units. Milo Cain, sales supervisor, Coast Counties Gas and Electric Co., designed the installation and Irvin M. Smith, electrical contractor installed it. The ornamental candle lighting fixtures, with which the room was originally equipped, were removed after this picture was taken. Foot-candle intensity previously was 10 with glare and objectionable color. Under the new lighting, the foot-candle intensity is 25, in a room 30 ft. wide and 45 ft. long.

AUTO LIFT LIGHTING

On auto lifts, 6 units on each side of the wheel track with 50- or 100-watt rough service lamps and a protecting strip to eliminate direct glare are quite satisfactory. Recessed units with lens type cover plates or special heavy-duty



pit lighting equipment with prismatic covers and wire guards are used for automotive, trolley, and roundhouse repair pits, as illustrated. Units on 6- to 8-foot spacing on each side of the pit with 100- to 200-watt lamps are recommended. Supplementary lighting can be provided by a portable floodlight, as illustrated.



DIFFUSED ILLUMINATION of 30 foot-candle intensity is here provided by use of 300-watt silvered bowl units.

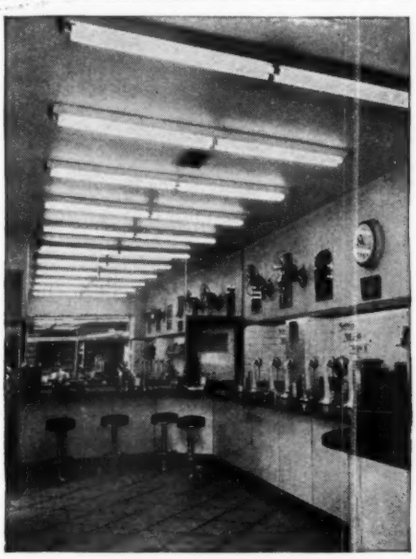
SILVERED BOWL DIFFUSER INSTALLATION

C. W. Wirth and Son of Rochester, New York have installed a lighting system of 300-watt silvered bowl diffusers in their shop. The units are placed on approximately 10-foot centers and provide 30-foot-candles of well diffused illumination.

The silvered bowl diffuser is of fairly recent development. It combines the efficiency and ease of maintenance of the RLM standard dome reflector, with the brightness of the Glassteel diffuser. It consists of a porcelain-enameled steel reflector equipped with a semi-diffusing Alzak aluminum insert. The unit is designed for and must be used with a silvered bowl lamp. It is extremely comfortable to look at, particularly at the angles where direct glare is ordinarily most noticeable. Because of the aluminum insert, it does not provide the same degree of diffusion as the Glassteel diffuser and therefore reflected glare and shadows are more pronounced.

A DRIVE-IN CALIFORNIA STYLE—Simon's Super Drive-In located in Hollywood has the zip and glamour associated with this movie center. The building is 36 feet in diameter and the surrounding canopy 72 feet in diameter. There are 40 foot-candles on the counters and 20 under the canopy. These are provided by eighty-eight 30-watt white fluorescent lamps mounted on the 12-foot ceiling. The lamps are arranged in 30 radial lines, 60 lamps under the outer canopy and 28 over the inside area. The owners are so pleased that they plan to adopt this type of lighting for all future structures. The lighting was designed by Bennett Forsberg Electric Company.

The Light That Means MORE Business



A typical "PARALUME" installation at Dewey's, Inc., in Philadelphia. The "PARALUME" is available in three sizes as illustrated, finished in Satin Chromium and Day-Brite "SUPER-WHITE" for 24" 20-watt and 48" 40-watt fluorescent lamps.

The Electrical Contractor who puts

his sales efforts behind the Day-Brite "PARALUME" reaps a double reward for his efforts. The sales he makes pay him both immediate and future profits, because Day-Brite quality leads to repeat business from happy, satisfied customers.

The Day-Brite "PARALUME" is the fluorescent lighting fixture that's engineered to give that extra punch in lighting for sales. And that is equally applicable to all types of commercial lighting requirements.

The "PARALUME" is built and backed by an organization known the country over for top-quality lighting fixtures . . . with wide experience in all phases of fluorescent lighting . . . and with practical knowledge of lighting for sales.

It's the fluorescent lighting fixture you can recommend without reservation . . . and that will sell for you as well as for your customers.

Day Brite LIGHTING, INC.

5434 Bulwer Avenue St. Louis, Mo.

It is to your advantage to sell only well-known, high-quality, correctly engineered lighting equipment. It will pay you big dividends in the long run by assuring satisfied customers for repeat business. For fluorescent lighting at its best, insist upon Day-Brite.

Manufacturers of "The Complete Line of Fluorescent Lighting Fixtures"

P&S
WIRING DEVICES

Specialists in the manufacture of Precision Made wiring devices for the most rigid requirements.

A logical source of supply for wiring devices on Government, industrial commercial and residential jobs.

Sold through Electrical Wholesalers

Catalog on Request

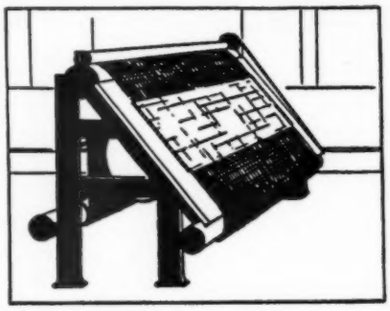
Pass & Seymour, Inc.
SYRACUSE, N. Y.

Better Lighting

[FROM PAGE 36]

LUMINOUS PANELS

Open weave fabrics and translucent materials, such as glass, paper, plastics, and liquids, will often reveal certain kinds of faults and defects by transmitted light. Large luminous panels



may be built in conveyor lines over which the material flows, or special inspection units, such as illustrated, may be employed. While the illumination requirements may vary considerably with the specific task, panel brightness of the order of 100 foot-lamberts is a fair average.

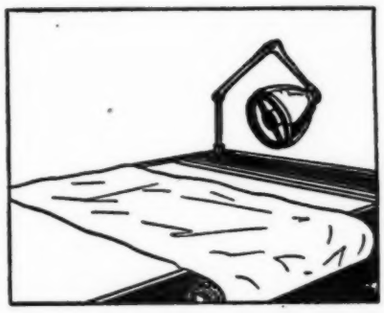
PICTURE LIGHTING

Good paintings and wall hangings deserve good lighting. The principal problem is to get an even distribution of light over the display, at the same time avoiding reflections from glossy surfaces or glass facing. With overhead lighting from either bracket type or lens plate units, a concentrating distribution is necessary both for uniform coverage and to avoid reflections. The units should be so directed that the highest candlepower falls on the lower quarter of the picture.

Lighting from below avoids glaring reflections, but is not practicable in some locations.

DIRECTIONAL LIGHT

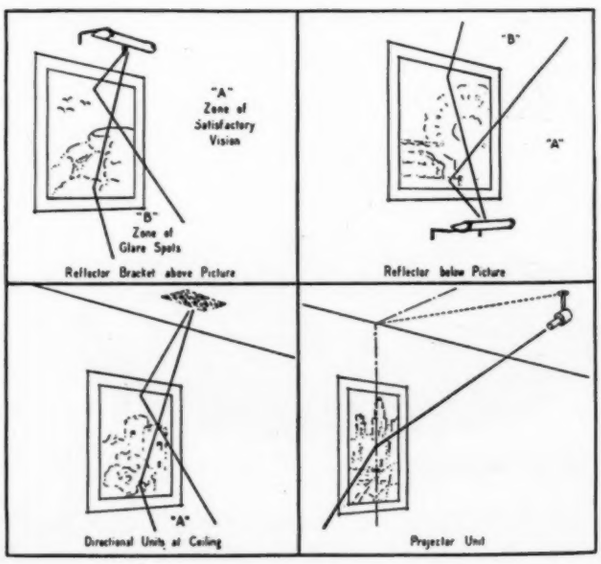
Surface flaws, irregularities in surface shape, pit marks, scratches, and cracks in materials are most easily seen by lighting which strikes the surface obliquely, casting a shadow and reveal-



ing the irregularities by shadow contrast. Thus wrinkles in roofing materials, such as illustrated, are revealed by small shadows, emphasized by sharp directional light. The light may be undiffused for mat surfaces, but diffused at the source for polished or shiny materials.

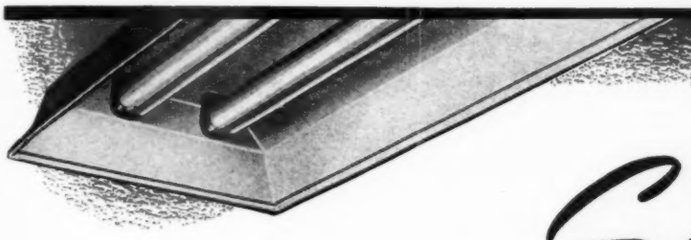
GAYLORDS, CHICAGO

The first floor sales area of Gaylords, occupying 2700 square feet, is lighted to a level of 40 footcandles. The general lighting is provided by twenty-five 500-watt Sterling recessed reflectors



FOUR WAYS—to light a painting to avoid glare and reflection and bring out color and detail.

MAZDA *Fluorescent* TWIN-LAMP *Lighting Units*



BUILT TO RLM *Specifications*

UNIFORM QUALITY AND CONFORMANCE TO RLM STANDARDS CERTIFIED BY ELECTRICAL TESTING LABORATORIES

● These units open new opportunities for selling the most modern light conditioning to cover a wide variety of industrial interiors. They make possible efficient, economical use of the newest type of daylight-quality illumination . . . with soft shadows and new freedom from glare and heat annoyances.

An RLM requirement for the new 60" Unit illustrated . . . typifying the completeness with which the RLM Specifications cover all design, construction and performance factors . . . is the use of apertures which direct 2½% of the light into the upper zone. This provides ceiling illumination that is uniform . . . free from shadows and bright striations. These apertures also provide ventilation . . . preventing substantial reduction in light output.

All Fluorescent lighting units built to RLM Specifications embody the following rigid lighting performance standards . . . all basic to the best and most economical results with Fluorescent Lamps: (1) Quality and weight of the materials used in reflector and housing; (2) Quality in reflection factor of porcelain enamel; (3) Shielding angles; (4) Dimensions; (5) Contour; (6) Light output efficiency of reflector; (7) Location and spacing of lamps; (8) Ballast equipment. Furthermore, the complete unit must be approved by Underwriters' Laboratories to meet National Electrical Code Standard requirements.

Continued compliance with the RLM Specifications by manufacturers of all RLM LABELED Lighting Units is assured by periodical rigid inspections at the plant of each RLM manufacturer; and through laboratory tests conducted by Electrical Testing Laboratories . . . an independent organization.

The Letters RLM Stand for Reflector and Lighting Equipment Manufacturers

RLM STANDARDS INSTITUTE
INCORPORATED

307 N. MICHIGAN AVE. • SUITE 1600 • CHICAGO, ILL.

THIS CERTIFICATE OF RLM UNIFORM QUALITY

McGILL

Wood-Handle Guards

McGILL All-Purpose Wood-Handle Guards provide protection from shocks . . . stand up well in grease and oil and can be washed easily with no ill-effect upon the wood handles. For many years the Steel and Shipbuilding Industries, and Railroads have standardized on McGILL All-Purpose Wood-Handle Guards. For more information, see your wholesaler or write to us.

McGILL Manufacturing Co.
Electrical Division
VALPARAISO, INDIANA

Better Lighting

[FROM PAGE 38]

placed on 9-foot centers and twelve 300-watt wall urns placed in the columns. Supplementary lighting is provided by the same type of unit equipped with 200-watt lamps and recessed over the wall displays.

The floor is a very light Textolite having a good reflection factor, otherwise the ceiling might be somewhat dark and spotty in appearance.

RECESSED DIRECT lighting combined with indirect wall urns provides 40 foot-candles of light over this sales area.

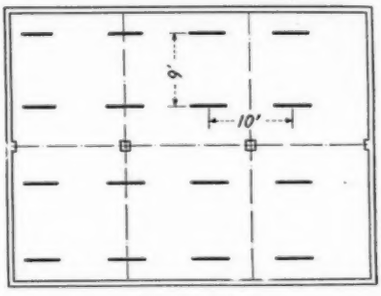
Lighting a BAKERY

PROBLEM—To provide adequate illumination of proper quality for the visual tasks involved in the mixing room of a bakery.

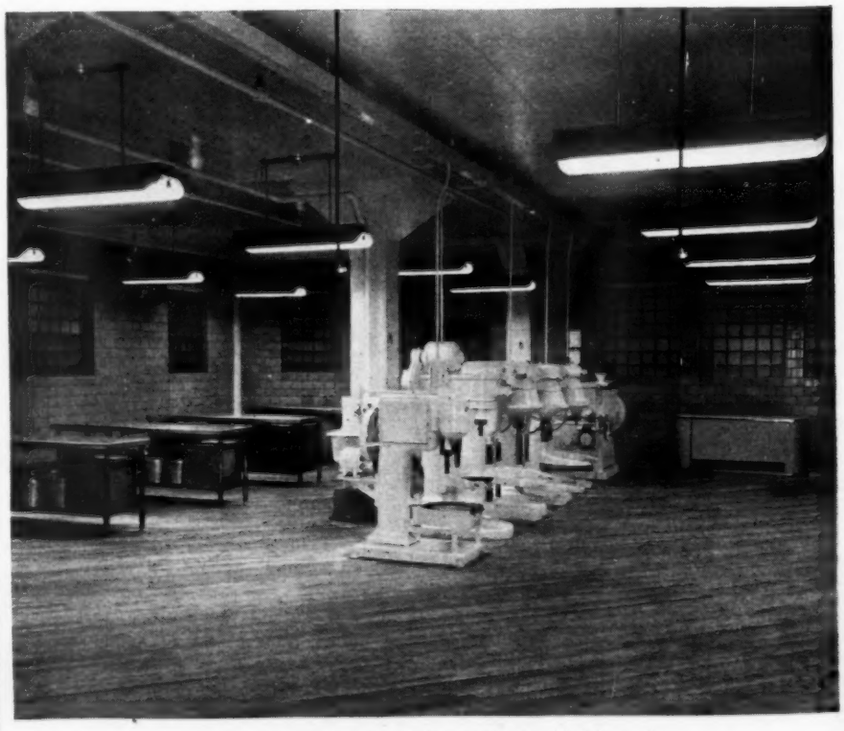
CONSTRUCTION DATA—The mixing room of this bakery has light colored tile walls with glass block windows. The re-enforced concrete columns and ceiling are painted white. The ceiling height is 11-ft. 2-in. All wiring is in concealed conduit.

SOLUTION OF PROBLEM—General illumination is provided by 19 industrial porcelain enameled fluorescent reflectors, each using two 48-in. 40-watt white fluorescent lamps. The units are suspended 9-ft. 6-in. above the floor on 2-ft. hangers and spaced on 9-ft. by 10-ft. centers. All units are mounted to the flush ceiling outlet boxes.

RESULTS—Illumination intensity on the working plane directly under the units is 30 foot-candles; between the units, 20 foot-candles.



PLAN VIEW *showing the arrangement and spacing of the lighting fixtures.*



BAKERY MIXING *room is flooded with high-intensity light by a number of industrial fluorescent reflectors.*

Fluorescent at its Finest by HYGRADE *the pioneers*

MIRALUME F-100
100-watt unit;
2 40-watt lamps.

DOUBLE your income this year

with superior-quality HYGRADE MIRALUMES!

Completely-guaranteed fluorescent lighting fixtures . . .

HERE'S the most sensational *selling story* in fluorescent lighting today:

No other fluorescent light fixtures *in the world* combine all the advantages of Hygrade MIRALUMES! . . . *Just listen!*

Finer light (Hygrade's patented lamp coating) . . . *sure, trouble-free starting* (Hygrade's patented Mirastat starters) . . . *lower maintenance* (Hygrade's easily demountable reflectors and patented lamp holders) . . . *plus a complete guarantee covering every part!*

You can build more business on MIRALUMES, because they're quality manufactured—better designed and engineered throughout. Wired and ready to install—complete with superior Hygrade Lamps. High power factor. Approved by Underwriters Laboratories. Starters easily accessible. Eligible for FHA financing.

WRITE TODAY for MIRALUME catalogue, prices, discounts. Dep't EC2, Hygrade Sylvania Corp., Ipswich, Mass.

NEARLY 100 PATENTS PROTECT HYGRADE'S PRODUCTS

Extraordinary lighting efficiencies are obtained in Hygrade Fluorescent Lamps by tuning the ultra-violet energy to 2537 Angstrom Units effective in causing the porous film (Hygrade Patent No. 2,096,693) to generate light as shown in Hygrade controlled Patent No. 2,126,787. Hygrade products are exclusively protected by nearly a hundred other patents, including No. 2,201,817 and No. 1,982,821.

Hygrade MIRALUMES

Complete with Hygrade Fluorescent Lamps

Hygrade Sylvania Corp., Est. 1901. Makers of Hygrade Fluorescent and Incandescent Lamps and world-famous Sylvania Radio Tubes

Copr. 1941 Hygrade Sylvania Corp.

Motor Shops

GAS FIRED CLEANING TANK

When the Electrical Engineering and Service, Inc., of Westfield, Mass., decided to clean their motors in an Oakite solution they built a brick enclosed steel tank for the cleaning operation. The square tank is constructed of $\frac{1}{8}$-inch steel boiler plate and is surrounded by one course of brick to provide insulation and added strength. The dimensions are 35-inches long, 29-inches wide and 28-inches deep. A gas flame under the center of the tank is used to heat the solution. A steel plate hinged to the tank serves as a cover.

***CLEANING TANK** contains boiling alkaline solution which removes all paint, oil and grease from motors. A gas flame under the tank heats solution.*

The stripped motors are placed in the solution which is brought to a boiling point. After remaining in the boiling solution about an hour, the motors are taken out, washed with water and dryed in an oven. This alkaline Oakite solution takes all the paint, oil and grease out of the laminations and gets down to bare iron.

The solution is changed once every six months. But the oil, grease and dirt is skimmed off the solution frequently. This is accomplished by laying a sheet of paper on the surface of the solution. The oil and dirt adheres to the paper and is removed when the paper is taken off. This method of cleaning motors saves valuable time since the mechanics can be working on other things in the shop while the motors are in the boiling solution.

WIRE INSULATION STRIPPER

The wire insulation stripper built by the Economy Electric Co., motor repair shop, of Youngstown, Ohio, uses two $\frac{1}{4}$ hp., 1800 rpm., 110-volt single phase motors mounted diagonally opposite each other on a vertical cast metal base. Two wire brush wheels are mounted to the motor shafts which turn in opposite directions. Flat metal guards surround the brushes and support a V-shaped metal guide with a hole in its center for inserting the ends of the wire in the path of the rotating brushes. A variety of these metal guides are kept on hand for the different sizes of round and rectangular wires.

A blower motor, operating as a suction unit, draws the cotton lint from the brushes through a flexible tube connection and deposits it in a container mounted under the bench. This device has proved to be a great time saver in stripping the insulation from the ends of motor coils.

***INSULATION STRIPPER** for skinning ends of coils is an economical investment in this motor shop.*

MOTOR INDEX

Simple but time saving motor storage indexing used at the Commodore Electric Co. shop in Chicago can be applied to almost any kind of storage area.

Floors of the storage areas are divided into large squares with 3-inch wide painted lines. The squares are lettered alphabetically along the aisles. Bins and shelves are similarly divided into lettered sections.

***SIMPLE CARD** indexing quickly locates motors in stock space, by reference to section letter and shop tag.*

Each motor card in the file carries, in addition to name plate data, a shop number, which is duplicated on a conspicuous tag attached to the motors, and the storage area index letter. Any motor in stock may thus be quickly located from the file card by shop number in a small area without reference to obscure name plate markings.

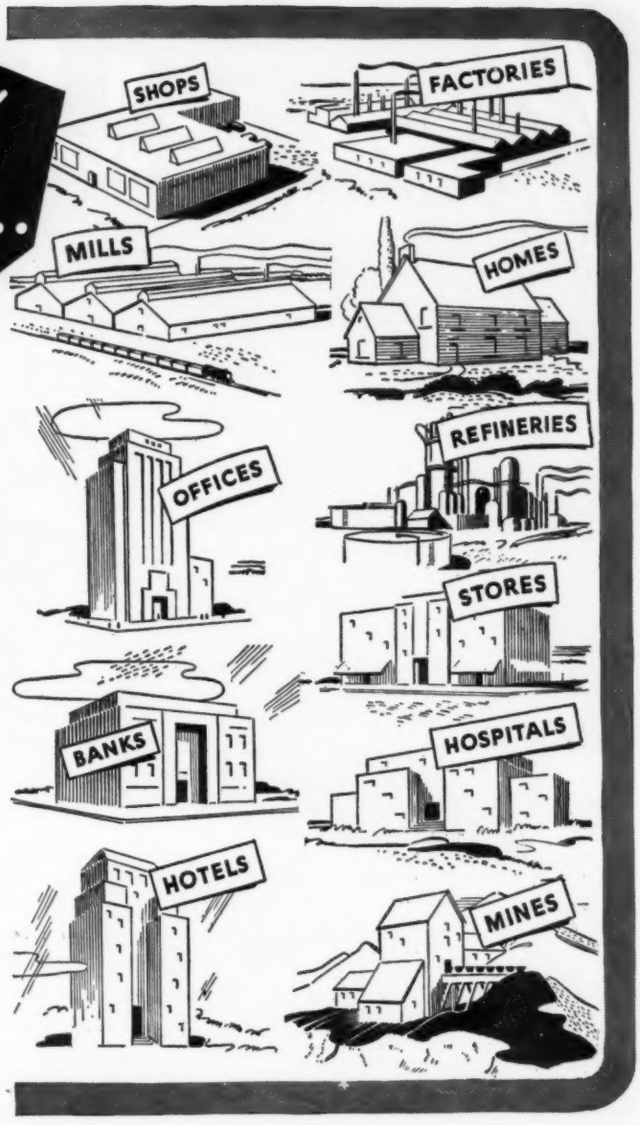
PORTABLE INSULATION FORMER

A portable insulation former has been designed and built by the J. J. Reddington Co., electrical contractors and motor shop specialists of Boston, Mass., for use in their motor repair department.

The mechanism is constructed of pieces of flat steel and measures 16-inches long and 5½-inches high, excluding the operating handle. It is supported by four legs which are joined together at the bottom by two pieces of 1-in. by 1-in. angle iron, permitting it to be fastened to any table top by four screws. However, it is heavy enough that it can be used without being bolted down and so can be taken from table to table for use on particular jobs. Generally it is left on the table where the insulated paper is stored and cut.

Slot depth is obtained by a graduated adjustable plate, held by two set screws, between the bars that hold the insu-

All these and others too...



..Your Prospects for Fast, Dependable Automatic Electric Intercommunicating Systems

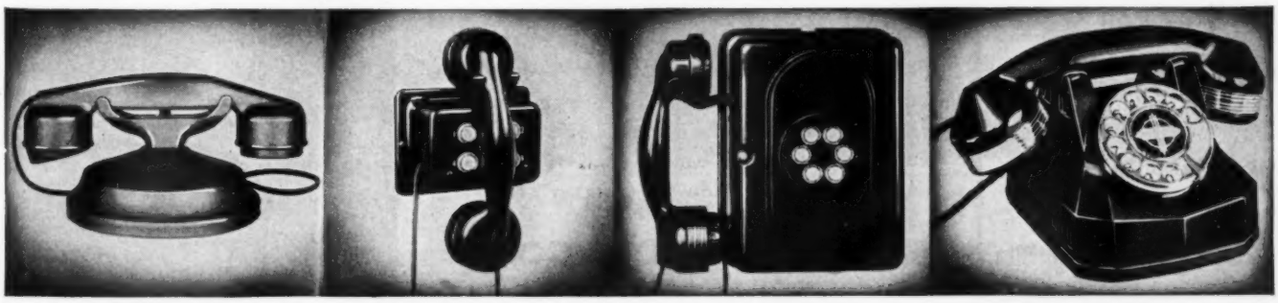
Today, almost every organization you can name is a live prospect for some type of Automatic Electric time- and step-saving private telephone system.

The quickened tempo of business has made these companies acutely aware of the limitations of their present interior communication facilities. They realize that it is no longer possible to get by with outmoded equipment or with hit-or-miss methods. They are facing the immediate necessity of eliminating this bottleneck.

Introduce them to the Automatic Electric line of intercommunicating systems. Four of the most popular of the many types available are briefly described below.

Ask your electrical wholesaler for full information, literature and prices on this profit-producing line.

Automatic Electric intercommunicating systems are designed for private service. They are not intended to be connected with the public telephone system.



SERV-U-FONES

Low priced, all metal telephones, in common talking systems of two to ten stations. Conveniently packaged and simple to install.

IDEALFONES

Wall type with molded handsets. Offered with one or five buttons for common talking service up to ten stations.

INTERCOMS

Supplied in both desk and wall styles—with molded plastic handsets. Common talking systems of two to eleven stations.

P-A-X's

Private automatic exchange systems, providing dial service and secret connections, from ten stations up. Telephones in a variety of types.

AUTOMATIC ELECTRIC

PRIVATE INTERIOR TELEPHONE SYSTEMS

Distributed by: AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 West Van Buren Street, Chicago, Illinois

Sales and Service Offices in Principal Cities • In Canada: Canadian Telephones & Supplies, Limited, Toronto

Before you bid on the next job consider the labor cost item. The one way for you to cut labor costs is to have fast, efficient tools, . . . tools to make it easier and faster for the man on the job. And Greenlee Tools were designed for just that purpose. For instance the Greenlee Cable Puller, shown above, is a tool that will save many hours of work when pulling in cable. This handy tool clamps right on to the conduit through which the cable is pulled, and cuts pulling time in half. Then for bending jobs there's the Greenlee Hydraulic Benders for conduit from 1¼ to 4½-inch, to cut labor costs and eliminate many manufactured bends and fittings. Look into the complete line of Greenlee Tools today . . . just send coupon below for Catalog 31E.

Other GREENLEE tools to Save you Money

- Hydraulic Pipe Pushers
- Knockout Tools
- Bit Extensions
- Joist Borers
- Electricians' Auger Bits

GREENLEE TOOL CO.

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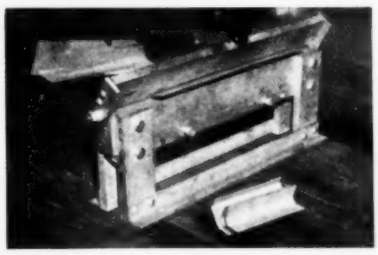
ALSO INFORMATION ON.....
Name.....
Address.....
City..... State.....
My Jobber is.....

GREENLEE
HAND TOOLS FOR THE ELECTRICAL WORKER

Motor Shops

[FROM PAGE 42]

lating paper in place. The edges of the bending plate, at the top, are slightly rounded to prevent binding, cutting or cracking the insulating paper. Insulation for any slot depth and width can be formed by simply adjusting the graduated plate in the center of the mechanism.

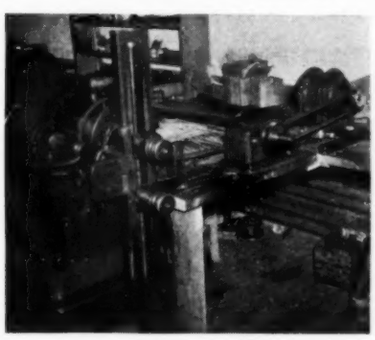


PORTABLE FORMER for bending insulated paper for stator slots can be used either mounted or unmounted. Produces a smooth bend without damaging the insulating paper.

VARIABLE SPEED FOR WINDER

Modern motor shop practice demands easily controlled variable speeds for the motor driven equipment. And this means modernizing some of the older equipment which depended upon step pulleys for speed changes.

The Electric Motor Repair Company, Waterbury, Conn., has accomplished this modernization of a winding machine by installing an Ideal Model A, Size 4½, speed changer between the motor and winder. The ¾-hp., 1200 rpm. motor is V-belt connected to the speed changer which, in turn, has a V- to flat-belt connection to the winder. The five points on the changer gives the necessary variety of speeds on the winding head.



SPEED CONTROL of this winding head is accomplished by the installation of a speed changer between the motor and the winding machine. The result—more flexibility in the coil winding operation.

"After 9 months' mill operation, IVANHOE Fluorescent Lighting paid us 4 specific profits..."

says J. M. Shute

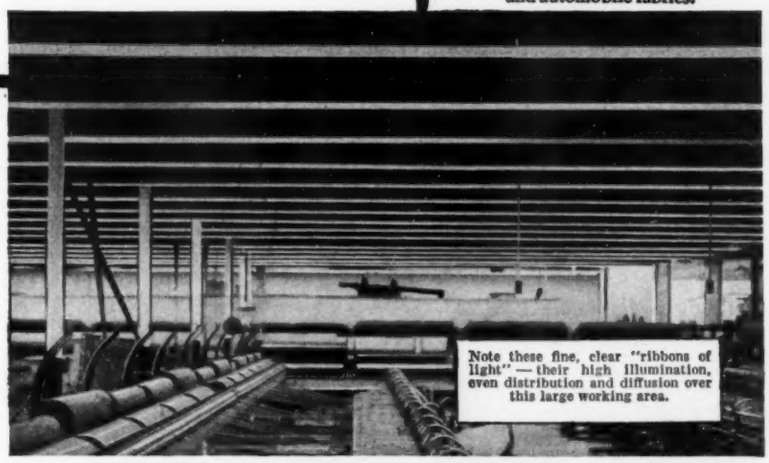
OF UXBRIDGE WORSTED CO., Leading Manufacturers of woolens and automobile fabrics.

1 Increase in weaving efficiency on one type automobile fabric from 81% to 84%, with a decrease of 22% in mending costs

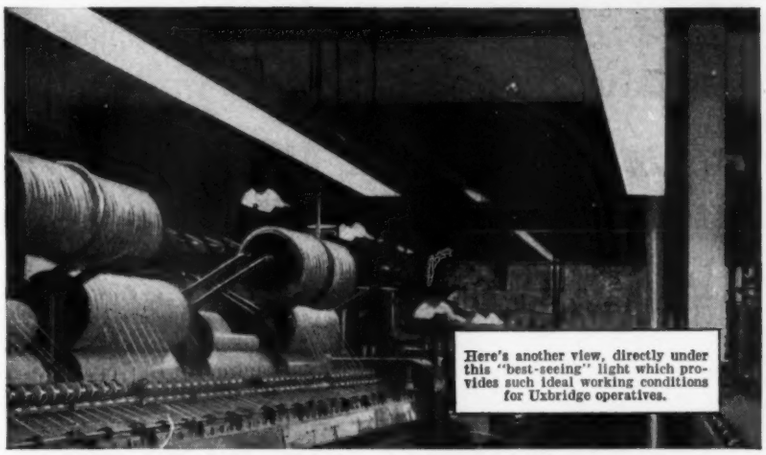
2 Increase in weaving efficiency on another type of auto fabric from 83% to 87.7%, with a decrease of 25% in mending costs

3 Increase in illumination in many departments to 50 foot candles and more, at a surprisingly low increase in cost

4 Increase in mill operatives' earnings through easier, quicker and better production



Note these fine, clear "ribbons of light" — their high illumination, even distribution and diffusion over this large working area.



Here's another view, directly under this "best-seeing" light which provides such ideal working conditions for Uxbridge operatives.

"50 FOOT CANDLER" OFFERS YOU THE PROFIT-OPPORTUNITY OF A LIFETIME!

"50 FOOT CANDLER" is the first RLM Continuous Fluorescent Lighting System providing 50 foot candles (or better) of general illumination. Outstanding feature is its "built-in wireway" (fixtures contain their own wireway channels, complete with all wiring and operating auxiliaries) saving your customers from 30 to 50% in installation costs alone!

That gives you a big edge on competition—gets you in at "the planning stage"—enables you to sell more jobs and bigger jobs. And, as a "plus"—because "50 FOOT CANDLER" is not a fixture, but a new and better *lighting system*—it is a valuable "door-opener" for you for industrial plants.

WRITE TODAY for new "50 FOOT CANDLER" Bulletin 1C . . .

THE MILLER COMPANY
MERIDEN, CONN.
Pioneers in Good Lighting Since 1844

"50 Foot Candler"

Only "50 FOOT CANDLER" can give you these lighting benefits

Higher illumination at no increase in cost

30% to 50% lower installation costs—with minimum relocation of wiring outlets and reductions up to 80% in plant wiring system . . . because fixtures contain own wireway

Easier, faster installation—with use of part of new lighting system while remainder is being installed

Uniform light distribution—complete freedom to move production equipment without changing lighting

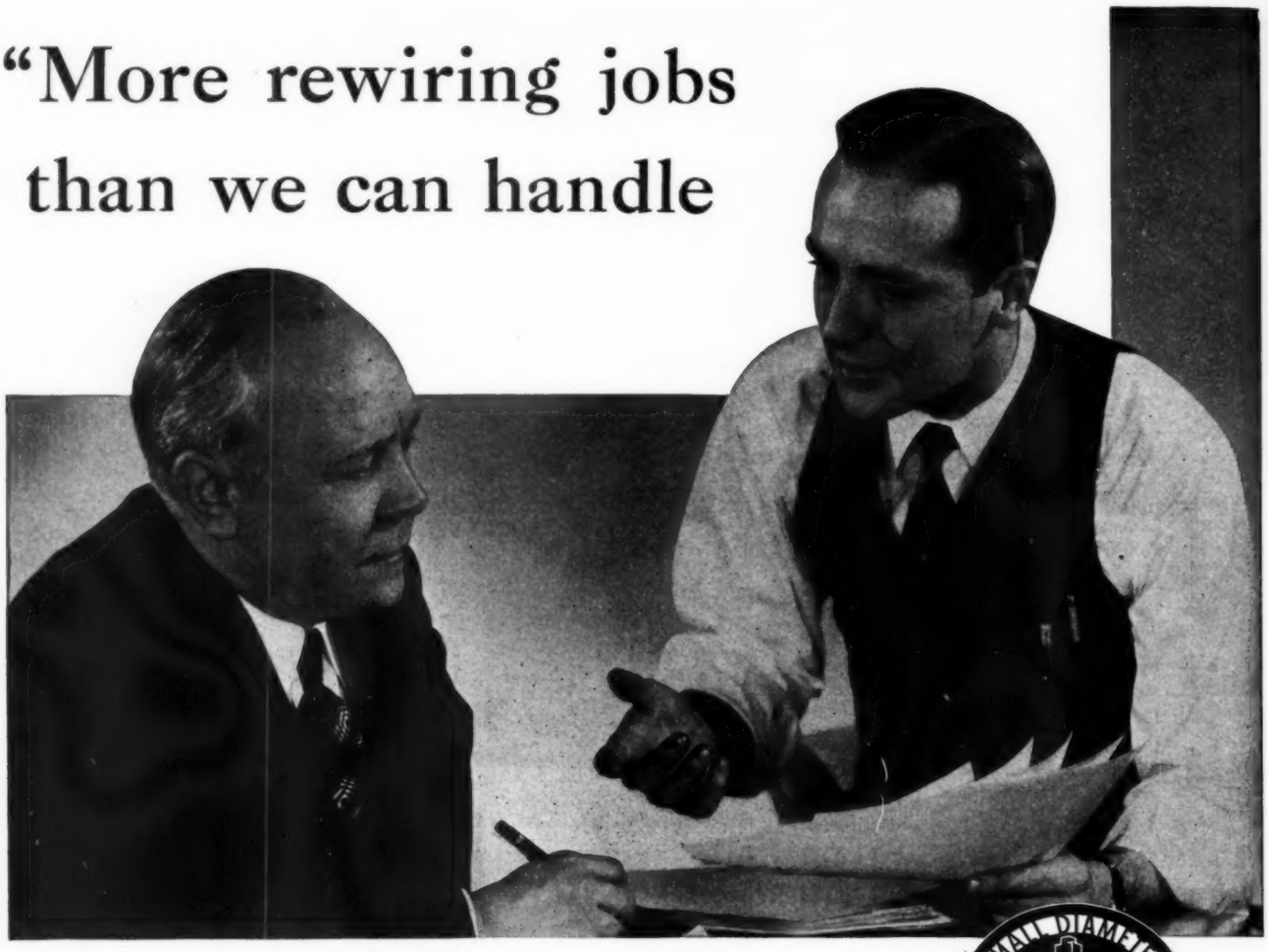
Clean-cut, modern appearance, no gadgets—with consistent-day-to-day "best-seeing" conditions for maximum employee efficiency and comfort

Simplified, less expensive maintenance—easy-to-clean porcelain-enameled fixtures, reflectors completely removable without disturbing wiring

Allowance for future growth—increases in illumination as high as 45% practical to meet changed lighting needs; lowest possible obsolescence factor

RLM *Continuous* FLUORESCENT LIGHTING SYSTEM

"More rewiring jobs than we can handle



thanks to these new AMPEROX *Small-Diameter Building Wires"*

"BUILDING operators in this district were up against it. They were losing tenants because they couldn't supply enough electrical capacity. And their old conduits were loaded to the hilt. We could understand why they didn't want to go to the expense and nuisance of ripping out the old conduits and installing new and larger ones.

"But that's all changed now. These new Amperox Small-Diameter Building Wires make it possible to double or even triple present current-carrying capacity without over-filling the old conduit. In one rewiring job, we cut the estimated cost from $70,000 to $10,000; and in a smaller job, from $408 to $185.

"Now we're getting more rewiring jobs than we can handle. With costs down to a fraction of what they were before, building operators are installing adequate wiring without waste of time."

COMPLETE LINE—American Steel & Wire Company produces a complete line of small-diameter building wires, including Amperox heat-resistant grade (Type RHT), Amerite performance grade (Type RPT), and Ampyrol synthetic insulated (Type SN). All are produced with the same quality and precision which characterize electrical wires and cables by American Steel & Wire. Write for data.

SMALL DIAMETER AMPEROX BUILDING WIRES

Comparative Diameters

Standard Type R Code Wire

	(8)	(10)	(12)	(14)
Rubber	4/64"	3/64"	3/64"	3/64"
O.D.	.290"	.230"	.210"	.190"

Amperox Small-Diameter Wire Type RHT

	(8)	(10)	(12)	(14)
Rubber	3/64"	2/64"	2/64"	2/64"
O.D.	.250"	.200"	.180"	.160"

Approved by Underwriters' Laboratories

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Export Company, New York

UNITED STATES STEEL

Industrial Electrification and MAINTENANCE

EXIT SEVERE OPERATING CONDITIONS

LAST month this department dealt with the problem of meeting severe service conditions in industry by using the proper types of equipment. Now, the accompanying discussion tells how to eliminate these conditions and thus increase the quality of the product and the efficiency of machine and operator.

Of course, temporary adjustments may always be made—just to get by. But the real problem is to find the "fly in the ointment" and get rid of it permanently. There are many cases where moisture, cold, dust, humidity and other conditions increase maintenance costs and slow down production because of the frequent attention required by equipment operating under these circumstances. And today, when production schedules are at an all-time high, production delays cannot be tolerated. So, more attention is being directed to the elimination of any factors that may contribute to these delays.

And so a questioning eye is turned to the maintenance man for helpful suggestions. For he, being closest to the problem at hand and responsible for continuity of operation, should have some ideas on how to get rid of pesky conditions that lead to trouble. It is to his advantage, as well as that of his company, to permanently rid himself of these headaches. And so, for his benefit, the following pages contain several solutions to problems encountered where severe service conditions existed.

Previous articles covered—

1. Simplifying Electrical Maintenance
2. Preventive Maintenance of Distribution Systems
3. Preventive Maintenance of Electrical Equipment
4. Reducing Power Costs
5. Maintaining Good Power Factor—Part I
6. Maintaining Good Power Factor—Part II
7. Meeting Severe Service Conditions
8. Eliminating Causes of Severe Service Conditions (this issue)

Future articles will discuss—

9. Providing Adequate Capacity for Increased Demand
10. Increasing Flexibility of Electrical Service
11. Safety Protection for Electrical Operations
12. Extending Automatic Control
13. Electrifying Operations to Reduce Unit Costs
14. Methods for Handling Changeovers and Live Circuits

ELIMINATING CAUSES OF SEVERE SERVICE CONDITIONS

WHAT to do with electric equipment to meet severe service conditions was discussed in this department in the January issue. This discussion will consider some of the common causes of severe service conditions and how they sometimes can be eliminated.

As an analogy: Local medical treatment is given to counteract pain, but the cause of affliction must be determined and remedied or eliminated to provide a cure.

In his own field the electrical maintenance man has many problems to solve—one class being the elimination of causes of severe service conditions. His advice on similar problems relating to plant operations and processes is often sought by the works manager. Space will not permit detailed problems and solutions. However, a selection has been made of five contributing causes of severe service conditions and some solutions are offered for each. These examples in the form of case studies will suggest to the electrical maintenance man a few ideas that may be new—

1. Cold weather is often a contributing, and sometimes a basic cause of a bottleneck in production. For example.

(A) In an unheated part of the plant at Kelley Island Lime & Transport Co., Buffalo, warm moist lime enters a pulverizer. At temperatures below 40° F, the lime caked, adhered to the rollers and jammed rolls and chute. Belts driving the rolls would pull off, and the rolls had to be turned backward and forward with a wrench. Also the chute had to be pounded to dislodge the frozen lime.

By installing three 500-watt strip heaters on each chute and roll casing, an uninterrupted flow of lime is maintained. In cold weather the heaters are turned on about an hour before starting time. The result: (a) rolls and chute are sufficiently warm to start produc-

***SUCTION CLEANING** gets rid of industrial dust on switchboard and floor, also removes carbon-brush dust from motors, in a motor room of a hot strip mill.*

***STRIP HEATERS** fastened to roll casing of pulverizer and chute eliminate caking of moist lime in cold weather.*

tion; (b) elimination of a loss of 1 to 1½ hr. when starting, and (c) 15 percent more production on winter days.

(B) In a feed mill in the state of Washington four 60-ft. lengths of industrial heating cable, 400 watts each, were coiled around suction pump inlets at the bottom of a molasses pit. The cable warmed the molasses sufficiently to permit continuous pumping of 75,000 gal. during the coldest weather.

(C) Heavy oil such as SAE 70 stored in outside tanks usually requires heating so that it can be handled in winter, otherwise it puts a heavy strain on a high-speed pump. An oil company in Kansas overcame this severe condition by using a 4-speed motor with a pole-changing drum switch. The pump can be operated at speeds suitable for the flow of oil at any temperature. The heating operation is eliminated and as a consequence color changes in oil are avoided.

(D) Prevention of freezing in roof water tanks is an important subject at this time of the year. Data on sizes of tanks and electric heating units is given in the Maintenance Guide Sheet on opposite page.

2. Dust and fumes—Cleaning of equipment, floors, pipes and overhead structural members, when done by hand brushing, scraping or blowing with compressed air, raises a dust which settles again in the vicinity. To avoid having employees working and apparatus and delicate devices operating in a dust-laden atmosphere, suction cleaning which removes and collects dust and dirt is becoming standard practice. Some examples of industrial vacuum cleaning are presented.

(A) At the O. M. Edwards plant, Syracuse, N. Y., C. L. Shaffer, superintendent of maintenance, reports that portable vacuum cleaners have been used to clean dust from motors and other electric equipment, to clean soot from tops of boilers and pipes, to remove metal chips, and dirt from floors. In addition, the cleaners have saved his firm many dollars on these operations.

(B) At the Texileather Co., Toledo, Ohio, dust made in refinishing cloth is difficult to capture because it is fluffy and fuzzy—lighter than down. Here electrical suction is used to collect the dust.

(C) In a coal cleaning plant, coal dust may be as much as 2 inches deep at the day's end. The "sweeping" with a vacuum cleaner (central plant system) is done without raising a dust. In this case the material collected is salvaged.

***FLUORESCENT LIGHTING** provides 65 foot-candles on the work. This "inspector" of Kaywoodie pipes has been relieved of fatigue and headaches caused by eye strain. The lighting unit has three 20-watt daylight lamps and is mounted 30 inches above the bench.*

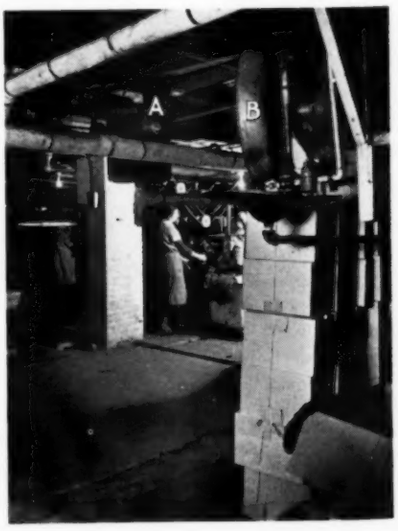
(D) Small electric parts are no exception in their need for cleaning. Removal of dust from contacts, switches and frames in a mid-west telephone exchange improved service to subscribers. The switch frame to be cleaned is enclosed by a curtain, but the top is left open. An exhauster is placed at one side and another at the bottom. Air is drawn from the curtained area and exhausted through filters to trap the particles of wool, cotton fiber, and dirt. Blowing by compressed air is done from top to bottom, and from the side opposite the exhauster units but towards them, to avoid recontaminating cleaned portions. In one month troubles caused by presence of dust and lint in contacts and other mechanisms were reduced over 50 per cent.

Ventilation is an important item in the prevention of severe service conditions. Dust and fumes must be removed and fresh air supplied to maintain clean and healthful conditions. How some companies in various industries solved their ventilation problems is explained in the following paragraphs.

(E) The Key Company, East St. Louis, Ill., built a foundry to make pressure castings for oil refineries and incorporated several features for dust and fume removal. (a) All dust producing operations have hoods from which the dust is exhausted to a Roto-clone and the air discharged to atmosphere. (b) The roof is shaped and arranged to localize smoke and minimize the tendency for it to "drift" the length of the building. (c) In the roof there are 32 motor-driven ventilators which provide 20 changes of air per hour.

(F) To remove sulphuric acid fumes at Kelsey-Hayes Wheel Co., Detroit, fans blow air at 140° F over the surface of each pickling tank. The traveling hot air serves as a blanket and absorbs the fumes. As this heated and fume-laden air loses velocity, it rises naturally to exhaust hoods from which it is drawn off by other fans. Air deficiency in the building is corrected by introducing outside air tempered by three air heaters. See an accompanying illustration for a similar ventilating job at Truscon Steel Co.

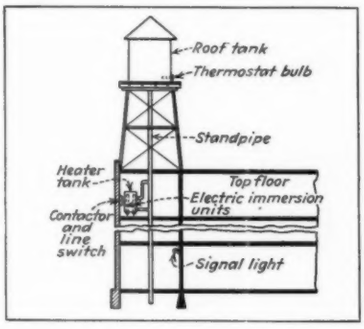
(G) Clean air for both space and process installations can be provided electrically. By this method the dust particles are charged. When passed through an electrostatic field they are "precipitated" or attracted by collectors, in a similar manner as iron filings are attracted by a magnet. This electrical process of cleaning air is used by a number of industrial plants. Installations have been made also in commercial buildings and retail stores; for the



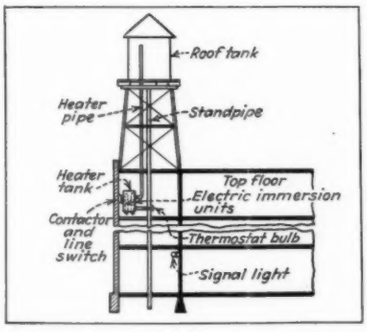
***UNIT HEATERS** (A) and humidifiers (B) maintain correct atmospheric conditions, even in coldest weather, in this basement winding room.*

MAINTENANCE GUIDE SHEET

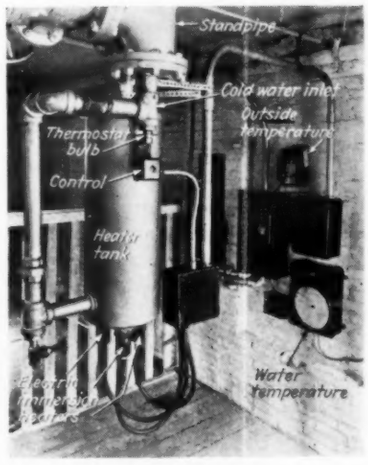
Prevention of Freezing in Roof Water Tanks by the Use of Electrical Heating Units and Thermostatic Control to Provide Heat Only When It Is Actually Required—



HEATER TANK PIPE connections when only a standpipe is available. Both inlet and outlet of heater tank connected to standpipe. Water in roof tank heated by local circulation set up within standpipe. Thermostat bulb placed at bottom of roof tank.



HEATER TANK PIPE connections when both standpipe and heater pipe are available. Cold water inlet of heater tank connected to standpipe. Warm water in heater tank discharged through heater pipe directly into roof tank. Thermostat bulb placed in cold water inlet of heater tank.



INSTALLATION of electric immersion heaters and control equipment. Recording thermometers for water and outside air are optional.

GENERAL REQUIREMENTS

To prevent freezing, water stored in a roof tank should be kept at approximately 45° F. Water in the standpipe and other pipe connections to the tank will have a slightly lower temperature. Heating system must be dependable, have sufficient capacity, and be properly installed to prevent formation of ice in any part of the tank or pipe.

EQUIPMENT REQUIRED

HEATER TANK: install on top floor of building, whenever practical. Connect bottom of tank to standpipe. Connect top of heater tank to heater pipe or bottom of roof tank, or to a high point on the standpipe. See illustrations.

ELECTRIC HEATING UNITS: immersion type; insert in heater tank. Use nearest standard ratings of heater units, but total ratings of all units should not be less than kilowatt values in the table.

THERMOSTATIC CONTROL: place thermostat bulb at bottom of roof tank when only a standpipe is used, or in cold water inlet of heater tank when heater pipe is used. Mount thermostat control box near heater tank.

LINE SWITCH AND MAGNETIC CONTACTOR: for main circuit to heaters; install near heater tank and accessible for inspection.

SIGNAL LIGHT (optional): install in maintenance engineer's office.

TABLE OF CAPACITIES FOR ELECTRIC HEATERS AND ROOF TANKS*

Tank Capacity, gal.	Elevated Wooden Tanks		Elevated Steel Tanks	
	Btu Loss per hr.	Heater kw.†	Btu Loss per hr.	Heater, kw.†
10,000	38,000	13	.....	...
15,000	49,000	16	.....	...
20,000	53,000	18	160,000	53
25,000	62,000	21	185,000	61
30,000	69,000	23	208,000	68
40,000	90,000	30	249,000	82
50,000	106,000	35	288,000	95
60,000	.....	..	332,000	110
75,000	135,000	45	382,000	125
100,000	164,000	54	460,000	150
150,000	.....	..	607,000	200

* Data developed by Consolidated Edison Co. of New York, Inc.

† Total connected kw of electric heating units required to bring water temperature to 40° F when atmospheric temperature is 0° F.

SOME ADVANTAGES OF AUTOMATIC ELECTRIC HEAT

1. Provides safety against freezing by eliminating human element, that is, remembering and knowing when to turn on and turn off the heat to the roof tank.
2. Relieves central steam heating plant of greatly increased load. Roof tanks need steam only during periods of extremely cold weather when the boilers are required to operate at their capacity for heating the building.
3. Eliminates overheating which is wasteful of fuel and is detrimental to wooden tanks and to paint on steel tanks.
4. Saves in fuel and labor costs by removing the necessity for maintaining steam pressure at night and over week-ends for the purpose of heating the roof tank. Also eliminates loss of fuel incurred by unnecessary heating due to lack of automatic temperature control.
5. Avoids danger of flooding the heating system or damage to boiler by excessive water pressure from tank in case of a leak in steam heating coils in roof tank.

OPERATING DATA OF A TYPICAL INSTALLATION

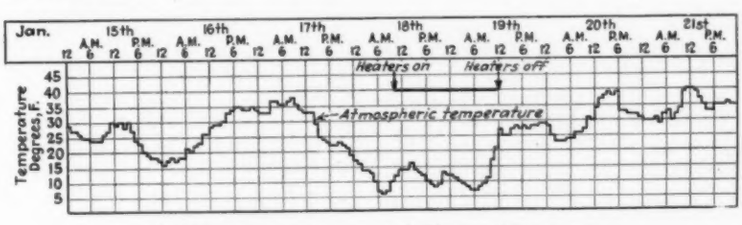
ROOF WATER TANK: 15,000-gal. capacity, installed at General Electric Supply Corp., New York, N. Y.

ELECTRIC HEATING UNITS: 3 immersion type, totaling 17.5 kw, inserted in a direct water heater.

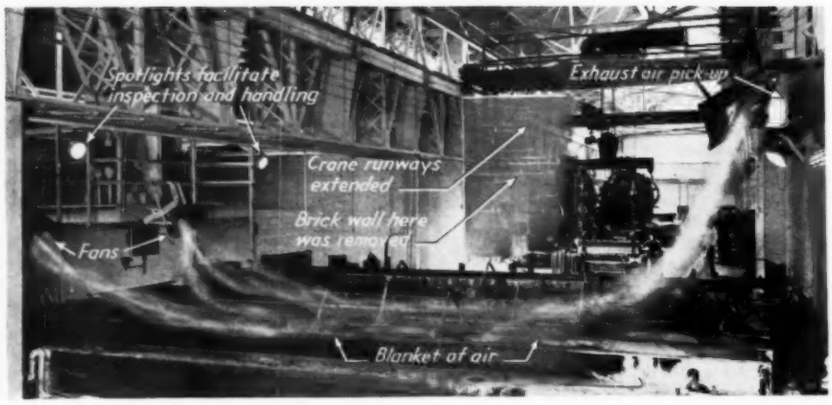
THERMOSTATIC CONTROL: set to energize immersion heaters when water temperature drops below 45° F.

TOTAL POWER CONSUMED: 662 kw-hr during heating season (1937-1938).

OPERATION ON A COLD DAY: see chart. Although recorded outside temperature averaged less than 7° F over a 3-hr period, and because of heat-storage capacity of water, heaters did not operate until 1 hr after the 3-hr period. For 19 hrs preceding operation of heaters, outside temperature averaged 17.6° F. During the 26 hrs that the heaters were in operation, the average temperature was 11.4° F.



Graphic record of "on" and "off" operation of electric heating units and of hourly outside temperatures



***AIR STREAMS** from two 24-in. motor-driven fans form a blanket to hold down and remove fumes from 16,700 gal. of 6 to 8 per cent sulphuric acid pickling solution. Air is directed downward to the liquid and sweeps across 33-ft. of open tank surface to the opposite side. The fume-laden air is picked up by an exhaust fan. This room was a tough working spot at Truscon Steel Co., Cleveland. Since the place is so well ventilated, a brick wall between pickling and stamping departments could be torn down, overhead crane runways were extended, and 10-ft. section of roller conveyor was installed at end of the pickling tank to receive material picked out of the tanks.*

latter, F. W. Woolworth store at 39th St. and 5th Ave., New York.

3. Humidity—Under ordinary conditions air in the plant contains too much moisture in summer and not enough in winter. In order to better facilitate handling, working and storage of materials, and to provide more comfortable working conditions for employees, it is necessary during the warm months to remove some moisture from the atmosphere and during the cold months to increase humidity. The following are case studies which are presented to illustrate the solutions to a few specific problems.

(A) To prevent mid-summer shutdowns, a lithographing plant installed a ceiling type cooling unit with a short length of duct. The weather is regulated in the electroplating and etching rooms. Relative humidity can now be maintained below 45 per cent for the processes involved.

(B) In a textile mill where a winding room is located in a basement, atmospheric conditions are maintained exactly right for process and comfort. Humidifiers maintain a relative humidity of 65 per cent—necessary to keep the yarn from becoming brittle and breaking during winding. Automatically controlled unit heaters keep the entire room comfortable, even in the coldest weather.

(C) High humidity may be caused by a specific operation. A case presented is that of a steam leaking through flexible joints on vulcanizing presses for rubber heels. By using electric strip heaters on the platens and automatic heat control, a saving of $8,000 a year in operating presses was effected and working conditions were greatly improved in this manufacturing plant.

(D) Platform scales rusted because they were used in damp places in a meat packing plant. Accuracy was maintained by monthly dismantling and reconditioning. This problem was solved by the use of electric spot heating units, generating a low heat which is suitable for the job. Each scale is fitted with three to five 150-watt 220-volt units fastened with cartridge fuse clips inside the scale housing.

4. Changes in temperature must be reduced for proper functioning and safe operation of equipment, and for comfortable working conditions. Electric heating units and forced-convection heaters can be employed to provide uniform temperature, and pilot control can be used to prevent overheating of equipment.

(A) Forced convection heating solved a problem at the plant of Harris-Seybold-Potter, Cleveland, where the production of intricate high-speed printing presses is exacting work. Heating in the factory was not uniform and an addition to the plant was to be made.

Improvements in the heating system were effected by installing 56 unit heaters, mounted in two rows, near the low-bay ceiling of the monitor type roof. Air is circulated the full length of the building, in one direction on one side and in the opposite direction on the other side. A thermostat set at 65° F controls each fan motor.

Results—Sufficient and uniform heat in all parts of the plant and office. The new system has operated 55 per cent more square feet of radiator load, at a saving of 3 per cent in fuel cost.

(B) To prevent motors overheating in an atmosphere where grain dust is concentrated, one grain products plant uses shaft-driven pilot control switches. These switches shut down the motors when the load reaches a point where excessive heating is likely to occur and cause considerable damage.

The shaft-driven switch has two disks placed close together, with lower portions immersed in heavy oil. One disk revolves with the live shaft, the other rotates only 18 degrees at which point it closes a set of contacts held open by springs. The contacts are closed only when the speed of the free rotating disk and the viscosity of the oil transmit torque to the second disk sufficient to overcome the spring pressure. When the motor is overloaded, speed of the shaft falls off and the switch contacts open, stopping the motor.

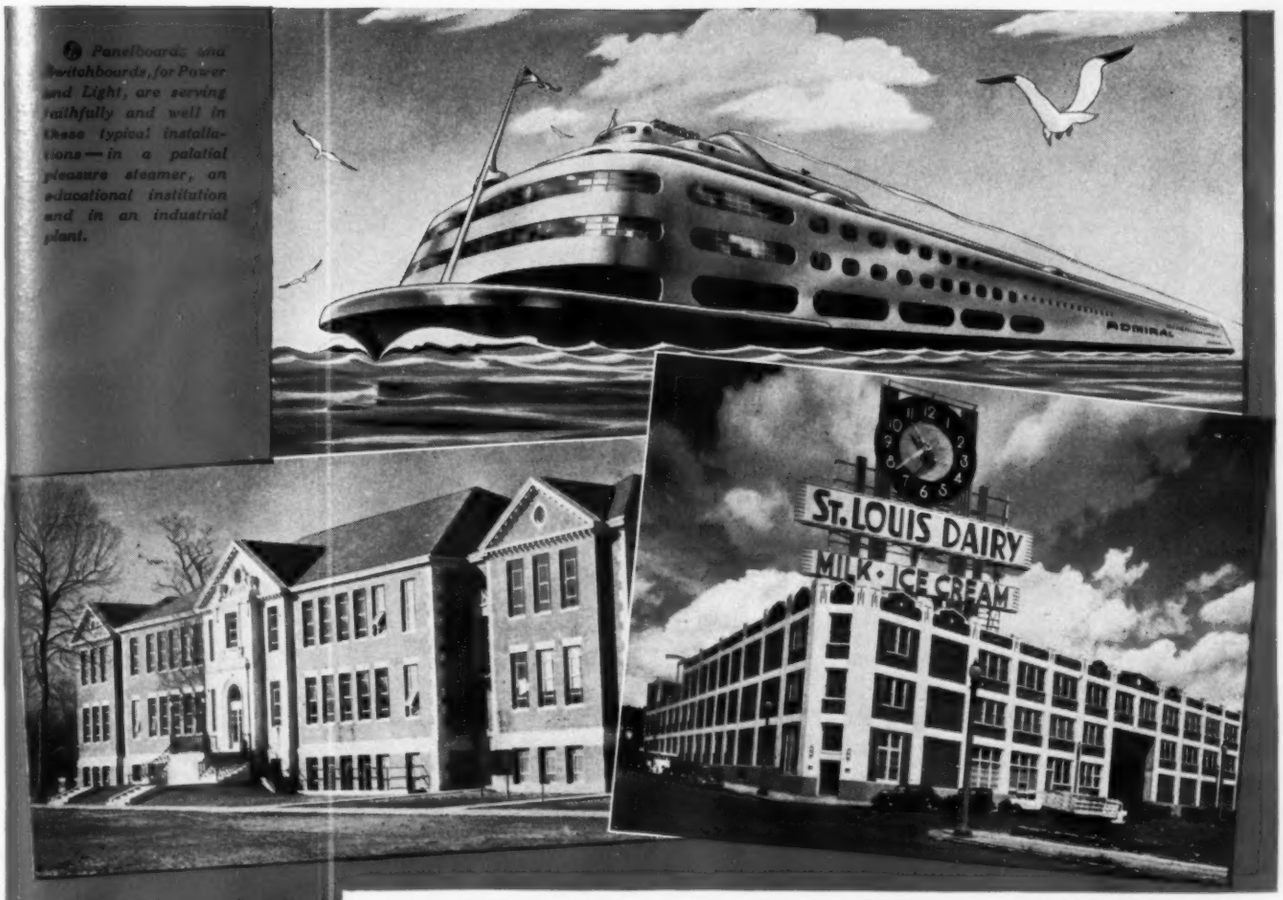
5. Poor Seeing Conditions—Illumination of good quality is necessary particularly for individual operations. Here is how lighting improved conditions for three companies in different industries—

(A) In making wire-cloth articles, light without glare or shadow is essential for accuracy in construction. Shadows and intense glare obstruct vision, tire the eyes, and reduce employee efficiency. The quality of good indirect lighting and the intensity of illumination give ample light for seeing, without glare or shadows.

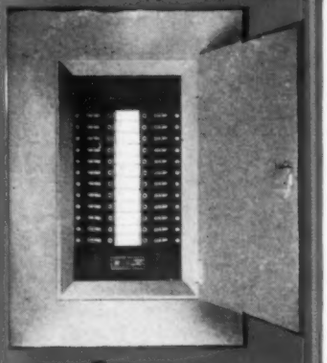
These facts were recognized by a New York manufacturer of filters for oil and emulsions, and sieves for flour. Indirect lighting was provided by 20-in. industrial type metal reflectors with flat white reflecting surface, each equipped with a 200-watt silvered bowl lamp. The arrangement has proved most efficient as well as economical. The illumination is ample for the night shift as well as on dark days.

(B) A new lighting system at Jasper Blackburn Products Co., St. Louis, stepped up general illumination to 20 foot-candles. Supplementary lighting was provided at each machine. Diffusing canopy units furnished 60 foot-candles at assembly benches. Wall and ceilings were painted. Better lighting has eliminated employee fatigue that was noticeable in the afternoons and at the end of shifts. In addition, production was increased 5 to 10 per cent.

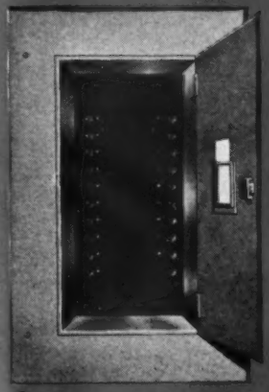
(C) Complaints of headaches by employees was stopped when the lighting system was modernized at a dry cleaning establishment in central New York state. Returns by customers were reduced nine-tenths even though production was increased 24 per cent. Glass-steel diffusers furnish 55 foot-candles on the spotter and presser boards.



Panelboards and Switchboards, for Power and Light, are serving faithfully and well in these typical installations — in a palatial pleasure steamer, an educational institution and in an industrial plant.



Type NA1B Dublbrak Circuit Breaker Panelboard, for Alternating Current and Direct Current Service.



Type LNT1P-3L Panelboard for Lighting and Appliance Branch Circuits.

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Ⓕ Panelboards

are designed for both power and light distribution — in a wide range of types and capacities. These comprise Dead Front, Safety Type Lighting and Appliance Branch Circuit Panelboards in fuse only, tumbler switch and fuse, and circuit breaker types. Also, Power (and Lighting) Feeder Distribution Panelboards, including Pull-out Type Disconnect, Klampswitchfuz Hinged Type Fuse Disconnect, Shutlbrak Switch Type, and Circuit Breaker Types.

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Portable Motor Drive Opens Skylights

Opening and closing of geared skylights requires 90 per cent less time and practically no physical effort, by the use of a motor drive that is moved from one window operating chain to another.

The portable drive consists of a ½-hp. motor coupled to a gear box with a chain pulley, all mounted on a truck. Control for reversing the motor is not necessary. To either open or close the windows, the truck can be turned in opposite directions before the chain is put on the pulley.

In a western plant, this method of opening a skylight requires approximately 1½ minutes as compared to 15 minutes for the same operation by hand. Thus there is a considerable saving in man-hours where a number of windows must be opened and closed each working day. Where there are five or more geared skylights, the portable motor drive would pay for itself in a short time.

Other advantages are: (1) better ventilation by having the windows open during working hours instead of remaining closed because of the physical work to open the skylight; and (2) cool interior to start work in the morning during very hot weather, by having the night watchman open the windows an hour or two before employees arrive.

Electrically Heated Oil Solves Cracker Production

An accurately controllable source of heat was required for cocoanut oil delivered to headers for spraying on crackers. The oil is supersensitive, becoming rancid if overheated.

Electric heat was found to give the required balance (minimum spread) between automatic control and surface temperature. A 5-kw. immersion type heater was installed in a closed length of 2½-in. pipe. Oil passes through the pipe from the capped end to the threaded end holding the heater, and is delivered to the headers at a constant temperature of 160 deg. F. and a pressure of 30 lb. per sq. in.

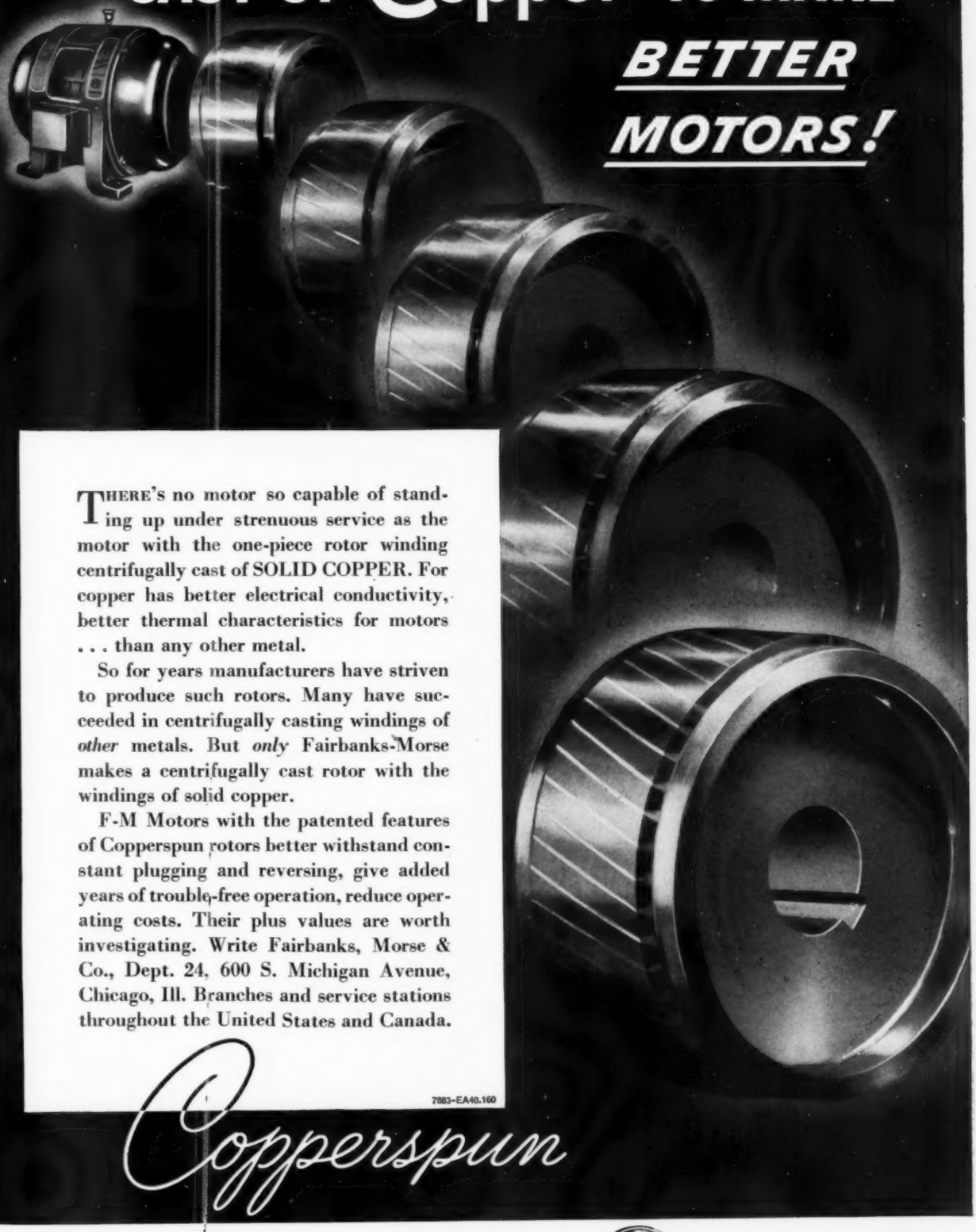
Approximately one barrel of oil is used for every 80 bbl. of crackers produced. Cracker production is at the rate of 3 bbl. per hour.

Spotlights Overcome Contrasts

Projector lamps are used at Electrical Testing Laboratories, New York, to brighten up low contrasts and illuminate bottoms of gray type impressions on blue wax stencils. They spotlight the work surface and are supplementary to regular office lighting.

The lamps are mounted on the 10-ft. ceiling, behind and slightly to the left of the typist. The beam of light makes

CAST OF Copper TO MAKE *BETTER MOTORS!*



THERE's no motor so capable of standing up under strenuous service as the motor with the one-piece rotor winding centrifugally cast of SOLID COPPER. For copper has better electrical conductivity, better thermal characteristics for motors . . . than any other metal.

So for years manufacturers have striven to produce such rotors. Many have succeeded in centrifugally casting windings of *other* metals. But *only* Fairbanks-Morse makes a centrifugally cast rotor with the windings of solid copper.

F-M Motors with the patented features of Copperspun rotors better withstand constant plugging and reversing, give added years of trouble-free operation, reduce operating costs. Their plus values are worth investigating. Write Fairbanks, Morse & Co., Dept. 24, 600 S. Michigan Avenue, Chicago, Ill. Branches and service stations throughout the United States and Canada.

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The EASIEST-TO-USE rig

Thousands of tiny rounded knobs on the inside surface lift cables away from the wall, reduce drag and make wire pulling up to 30% easier.

Three simple compression-type fi tings eliminate threading—ma positive, watertight joints—e the necessity for turning entire li in tightening joints.

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UNDERWRITERS' LABORATORIES, INC. INSPECTED RIGID ELECTRUNITE REG. U.S. PAT. OFF. STEELTUBES Z-48 ELECTRICAL METALLIC TUBING

ELECTRUNITE STEELTUBES always has been easy to use. Its light weight makes it easy to handle. The use of compression-type fittings ends tedious, dirty thread cutting. Its high ductility makes bending by hand an easy matter. And its knurled inside surface reduces wire pulling effort as much as 30%.

Now—with each piece of tubing plainly and *accurately* marked in feet and inches along the entire length—"Inch-Marked" ELECTRUNITE STEELTUBES is the easiest-to-use rigid steel raceway in the world.

Every length actually is a 10-foot rule. You can use the tube itself to measure the distance between two points. In laying out a bend or cut, there's no danger of inaccuracy caused by rule or pencil slipping just as you are about to mark the tube. You can work more accurately with less chance for error and wasted material.

Use "Inch-Marked" ELECTRUNITE STEELTUBES on your next wiring job—exposed, concealed or in concrete—and see for yourself why we say that it is the easiest-to-use rigid steel conduit in the world. Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio.

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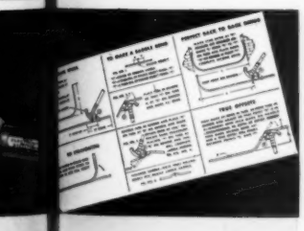
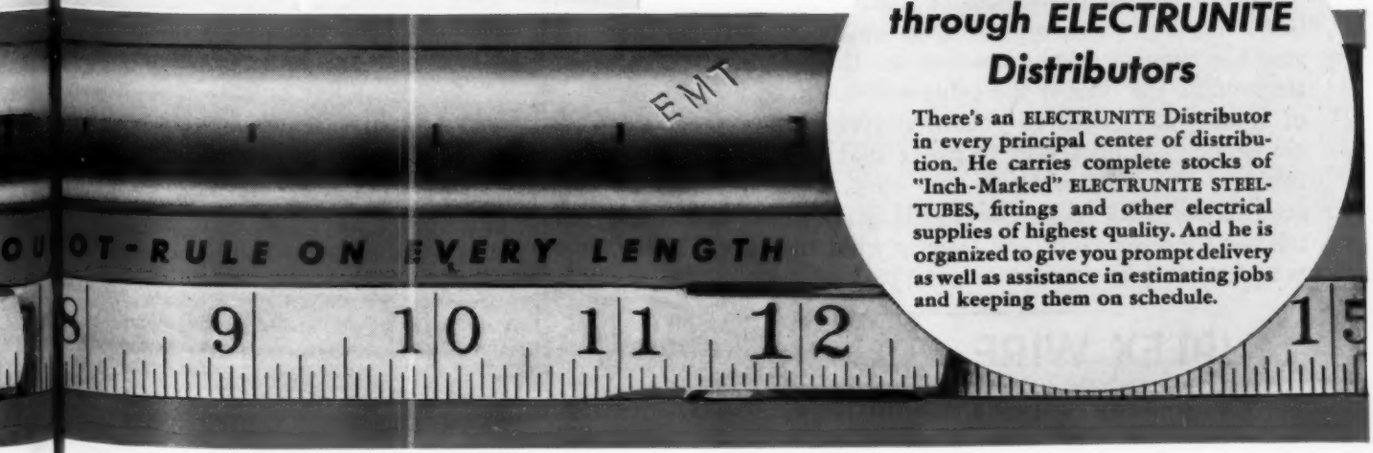


...new bending tag attached ...ery bundle of tubing provides ...lete bending instructions and ...rams for making various types ...nds.

With this new ELECTRUNITE Bender you can make any standard type or radius bend with less effort than ever before possible. Simple instructions are built into the bender.



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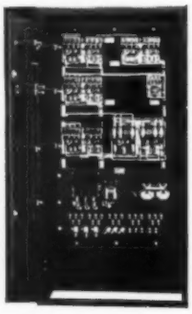
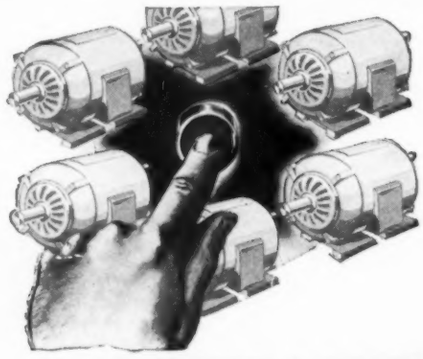
There's an ELECTRUNITE Distributor in every principal center of distribution. He carries complete stocks of "Inch-Marked" ELECTRUNITE STEELTUBES, fittings and other electrical supplies of highest quality. And he is organized to give you prompt delivery as well as assistance in estimating jobs and keeping them on schedule.



TYPICAL W. L. Composite Control. Floor mounted, double door type for Boring Mill. Controls 7 motors, all 3 phase, 220 volts, ranging from 1 to 50 H.P. Space available for oil pump and coolant pump starters.



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With Ward Leonard Composite Control Assemblies, one or many motors on one machine or individual motors on several machines are conveniently controlled from one central point. Ward Leonard has specialized in building Composite Controls for many years and has studies available for practically every industrial application. This wealth of experience is yours for the asking. Advise us as to nature of the controls you desire and full particulars will be sent to you.

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Every foot of stock sizes of TIREX cords and cables bears not only the name "Simplex - TIREX" but also the size and number of the conductors, their stranding and the voltage the cord or the cable was designed for. Think of what that means to you in convenience and safety. No longer is it necessary to guess that maybe a piece of cable is this size or that. No longer do you need to compromise with safety because TIREX cords or cables tell you for a certainty just exactly what they are. There is no guess work at all.

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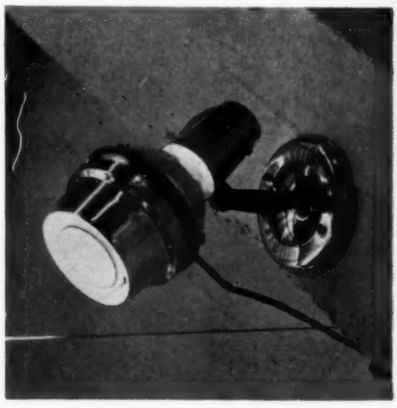
79 Sidney Street, Cambridge, Mass.

an angle of between 30 and 40 degrees to vertical, providing illumination of 100 foot-candles on the machine. General illumination in the room is 20 foot-candles, sufficient for ordinary stenographic work.

Each spotlight (one at each desk) is attached to an adjustable stem, and has louvers clamped on the 150-watt bulb. The louvers prevent extraneous light from

***PROJECTOR LAMPS,** ceiling mounted, provide light intensity of 100 foot-candles on work surface for each stenographer.*



***CLOSE-UP VIEW** of projector lamp with louvers.*

reaching other typists in the room, so much so that from the side it is difficult to tell whether the lamp is burning.

Typewriters with a dull finish are used. The lamps are positioned so as to prevent mirror reflections from polished parts of the machine from being thrown into the eyes of the workers.

E.T.L. stenographers believe that this method of lighting is particularly effective for mimeograph stencil cutting.

Prevent Fire In Elevator Shafts

This example emphasizes the vital importance of using elevator power and control cables of the fire-proof type or with flame-retardant outer covering.

An installation suffered the breakage of a steel strand carrying the weight of the cables suspended from the bottom of the car and from a midway junction box. The breakage caused a short circuit and arc which ignited combustible insulation. Fire spread to cables, endangering passengers.

GET THE CENTURY "JOB SELECTED" MOTOR THAT FITS YOUR JOB

Get Extra Protection Against Unusual Atmospheres with

NEW–IMPROVED Century TOTALLY ENCLOSED FAN COOLED MOTORS

At Left — Pressed steel fan cover showing openings for adequate ventilation. *At Right* — Motor with fan cover removed showing large unrestricted air passages in frame; non-sparking metal fan blades; finned end brackets for fast heat radiation.

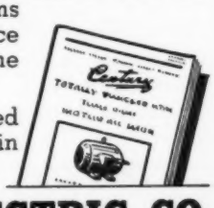
New, improved Century Totally Enclosed Fan Cooled Motors provide necessary protection where the air is foggy with metal cutting solutions, or there are abnormal quantities of metallic, abrasive and other dusts in the atmosphere that would ordinarily injure or clog the windings of a general purpose open motor.

The vital parts of a Century Totally Enclosed Fan Cooled Motor are completely enclosed. In reality, this is a totally enclosed motor, built within a cast iron protecting frame which provides ventilating passages and a fan for cooling. A blast of cooling air is produced by the non-sparking fan inside the pressed steel fan housing. The air is forced through passages between the cast iron frame and the motor laminations, but outside the protective enclosure.

The forced air cooling system keeps the large smooth air passages clean. The intake openings in the fan cover are not easily clogged and there is safety in the fact that a 5/16" rod will not pass through the ventilating openings.

The modern streamlined exterior of these new Century Totally Enclosed Fan Cooled Motors blends well with modern equipment design.

If atmospheric conditions are a problem in your plant, consult your nearest Century Motor Specialist. His experience with the same or similar problems is always at your service — may well save you time and money.



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One of the Largest Exclusive Motor and Generator Manufacturers in the World

YOU GET ALL THREE with a BLACKHAWK Pipe Bender

Blackhawk Benders do MORE than bend pipe. They include a Porto-Power Hydraulic Unit that can be used separately from the bending attachments. Here is the triple utility:

1 PIPE BENDING

Smooth, remotely controlled hydraulic power bends rigid conduit and pipe up to 4" diameter. Saves need for elbows and couplings and otherwise necessary cutting and threading.

2 MAINTENANCE AND PRODUCTION

Big range of attachments adapt the hydraulic unit to push, pull, bend, press, spread and clamp work. Pull gears and pulleys, lift machinery, (as shown at left)—do scores of other jobs allied to pipe bending.

3 SPECIAL JACK

Compact 10 or 20-ton ram (same as used in pipe bending) works in all directions — and at any angle. Preferred to all other types of jacks.

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Dept. 2021, Milwaukee, Wis.

Send Full Information on your Pipe Benders.

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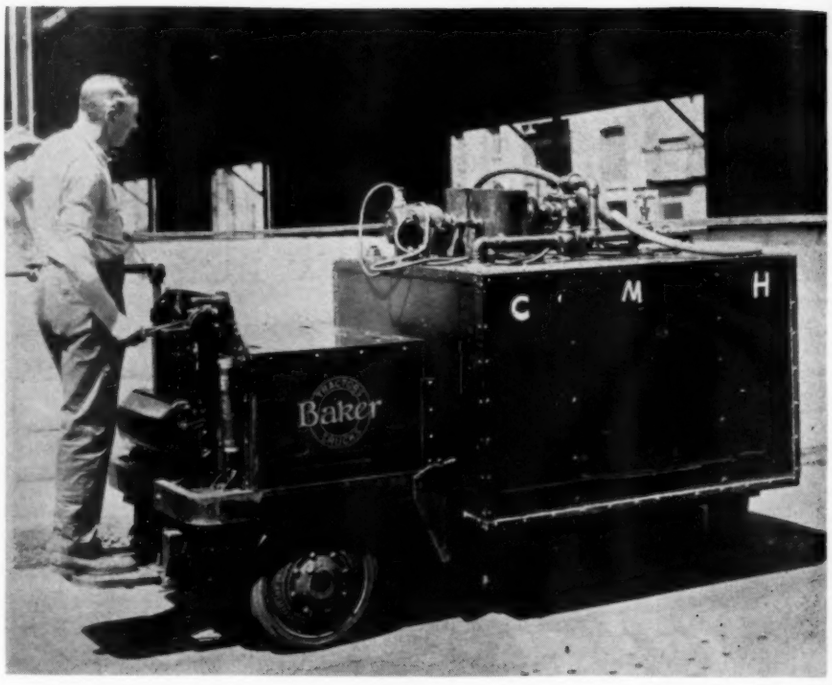


ON TO THE NEXT JOB—This combination of an electric truck and oil and grease tank is used by a maintenance department for periodic lubrication of machinery. (Baker-Raulang Co. photo)

Lubrication via Electric Truck

The maintenance department of a large manufacturer finds that the combination of an electric truck and lubricating equipment is indispensable.

To lubricate the machinery, periodic trips are made through the plant. This preventive maintenance program has resulted in savings which more than paid for the cost of the equipment.

A three-section oil and grease tank is fitted with suitable control valves and an electrically driven pump which can be plugged in at the location. The tank is mounted on a skid and is handled by an electric lowlift truck.

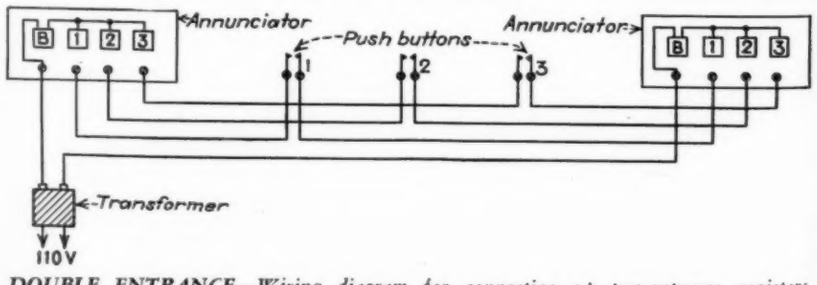
Series Annunciator as Local Pilot

Q. *Will you send us a wiring diagram showing the method of connecting two standard gravity drop hand reset annunciators in series? We wish to connect the annunciators in this manner to make certain that the signal has reached a remote point. One annunciator will be located within sight of the contacting devices and will act as a pilot.* — H.S.

A. In the wiring diagram it will be noted that the contacting devices are connected in series with the individual interconnecting wires between the two annunciators. One side of the transformer is connected to the common terminal of one annunciator, while the remaining terminal of the transformer is connected to the common terminal of the second annunciator.

Two Stop-Fire Ideas

One—A lightning surge entered an industrial substation although arresters were installed at the transformers. An oil circuit breaker was damaged. Sparks ignited a large pile of inflammable material near the switchboard. Operation



DOUBLE ENTRANCE—Wiring diagram for connecting up two-entrance registers operated by three push buttons.

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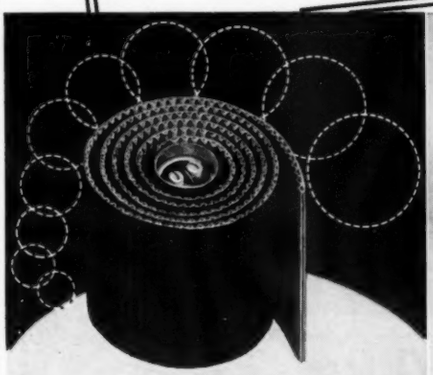

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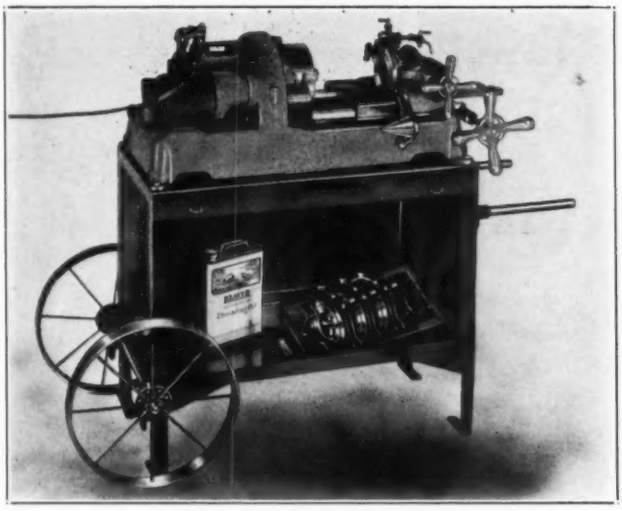

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⅛ to 2-inch Pipe and Bolt Machine

For ¼ to 2-inch pipe—¼ to 1½-inch bolts. Up to 8-inch with drive shaft and geared tools. Rack-and-pinion feed. Cast steel-iron base and cap. All-steel geared universal pipe chuck—with safety automatic wrench ejector; hinged full-range reamer; sliding wheel or knife cutoff; ring-type opening adjustable diehead—no hinge. Automatic gear-driven oil pump. All gears enclosed and run in oil. Choice of 110 or 220 volt universal reversible motor. Weighs about 280 lbs. In use in finest pipe shops throughout the country.

Write for Bulletin B.

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Stop complaints about unsightly appearance of holes in partitions, walls, floors, ceilings, etc. Use Carboloy Masonry Drill-Points for concrete, tile, porcelain, brick, slate, etc. Won't splinter fragile work. Drills clean, accurate holes free from ragged edges.

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No special equipment needed. Use in any rotary drill.

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For Better Service—

INSTALL **TRICO** REG. U.S. PAT. OFF.

RENEWABLE FUSES
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KLIPLOK CLAMPS
Lock fuses and clips together

KANTARK FUSES
With genuine fibre tubes (not paper)

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The color tells the size

FUSE PULLERS
Pull and replace fuses safely

OILERS
Glass and Unbreakable types for every application. Stops guesswork - bearing failures- waste- idle machinery, etc.

WRITE FOR FOLDER No. 300

TRICO FUSE MFG. CO., Milwaukee, Wis.
In Canada: IRVING SMITH LIMITED, Montreal

of sprinklers and extinguishers confined the damage to $700 in switchboard equipment and process material.

But there is a lesson in it for the electrical maintenance man—keep material, particularly of a combustible nature, at a safe distance from the switchboard.

Two—A steel wall plate was cut by welders so that electricians could install wiring in a long vertical pipe shaft. Watchmen with extinguishers were on duty. However, in back of the plate there was a tile wall containing cracks not filled with mortar and sparks entered the pipe shaft, igniting lint and pipe covering.

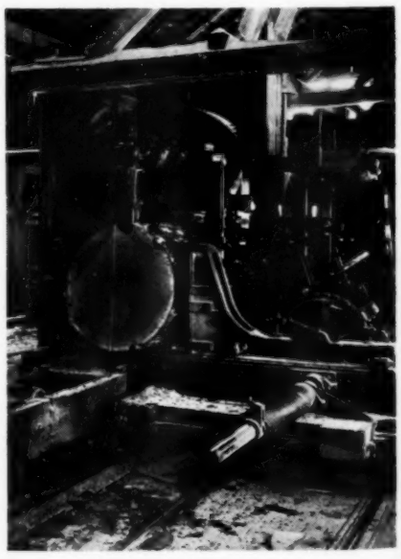
Two hours later smoke was seen coming from the shaft. After venting the shaft from the top to the outside, the fire was extinguished. Damage to communication lines and pipe covering amounted to $700. Lesson No. 2.—Future safeguards provided for extra care against the passage of sparks through openings leading to possible inflammable areas.

These two good suggestions come from the Associated Factory Mutual Group. They are worth remembering.

Motorization Boosts Lumber Production

Using a modern electric motor instead of a steam-engine to drive a band saw increased by 15 per cent the number of hardwood logs cut every hour at the Morcheses-Nowels Lumber Co., Columbia City, Ind.

When increased business demanded more steam than the boiler could supply, the steam-engine had to be discontinued from



***ELECTRIFICATION** of this band saw increased production 15 per cent, saved $2,500 on installation cost, and will repay original investment in less than 10 months.*

service. Replacement with a Westinghouse 100-hp., 220-volt, 3-phase, 60-cycle, squirrel-cage induction motor saved $2,500 on installation cost. Counting the savings effected through increased production, motorization will repay the original investment in less than 10 months.

Power is distributed to the mill at 2,300 volts. This and other motors are supplied through three 2300/220-volt transformers. The band-saw motor is controlled by a 220-volt autostarter and a 400-amp. disconnect switch.

Shunt Field Troubles!

The following procedure will enable the maintenance man, with the aid of a test lamp, to locate grounds in the field circuit of a d.c. shunt-wound motor.

Steps for testing for open and short circuits, and typical connections for a shunt motor with a manual starter, were published in a preceding issue (see *Electrical Contracting*, July, 1940, page 47).

Ground Trouble: Motor frame and one side of line not grounded

A.—To determine location of ground—
1.—Disconnect armature leads from both sides of line.
2.—Connect one motor field terminal to negative side of line.
3.—Connect test lamp between positive side of line and motor frame.
  a—If lamp does not burn, field coils are not grounded.
  b—If lamp burns, one or more field coils are grounded.
4.—Maintain above lamp connections, but open other side of line.
5.—Disconnect a jumper at a coil terminal so that the coils will be divided into two equal groups.
6.—Connect negative side of line to one motor field terminal (F1), then to other motor field terminal (F2).
  a—If lamp does not burn, group of coils is not grounded.
  b—If lamp burns, group of coils is grounded.
7.—Maintain above lamp connections but open other side of line.
8.—Disconnect all jumpers in grounded group.
9.—Connect negative side of line to terminal of each coil in grounded group.
  a—If lamp does not burn, field coil is not grounded.
  b—If lamp burns, coil is grounded.

Ground Trouble: Motor frame and one side of line grounded

B.—To determine which side of line is grounded—
1.—Completely disconnect motor from both lines.
2.—Connect one terminal of test lamp to motor frame.
3.—Connect other terminal of lamp to one side of the line and then to other side.
  a—If lamp does not burn, that side of line is grounded.

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Use FAST capacitors for better voltage regulation, reduced feeder losses and improved power factor.

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HOURS SAVED On Resharpening Ordinary Drills Will Pay For

PAINE "SUDDEN DEPTH" Carboloy Tipped DRILL POINTS

The savings on time and labor usually spent in redressing drill points will pay for these remarkably efficient Carboloy Tipped points of diamond-like hardness that outlast 50 ordinary points. They make smooth accurate holes for expansion anchors in concrete, stone, tile, marble and similar materials 50 to 75% faster.

Figures 900 980 950 955

A few of the complete line of PAINE Anchoring Devices. Fig. 900- Lead Expansion Anchor; Fig. 980- Malleable Shield; Fig. 950- Lead Woodscrew Anchor; Fig. 955- Fiber Woodscrew Anchor.

Write TODAY for new Drill Folder featuring Paine "Sudden Depth" Carboloy Tipped Drill Points that can be used in any portable rotary drill and complete catalog of anchoring devices.

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New York Warehouse & Sales: 48 Warren St.

b.—If lamp burns, that side of line is not grounded.

C.—To determine which field coil is grounded—

1.—Completely disconnect motor from both lines.

2.—Connect lamp between high (ungrounded) side of line and one motor field terminal.

a—If lamp does not burn, coils are not grounded.

b—If lamp burns, one or more coils are grounded.

3.—Disconnect a jumper at a coil terminal so that the coils will be divided into two equal groups.

4.—Maintain one lamp connection on high side of line.

5.—Connect other lamp terminal to motor field terminal (F1), then to other motor field terminal (F2).

a—If lamp does not burn, group of coils is not grounded.

b—If lamp burns, group of coils is grounded.

6.—Disconnect all jumpers in grounded group.

7.—Maintain one lamp connection on high side of line.

8.—Connect other lamp terminal to each terminal of field coils in grounded group.

a—If lamp does not burn, coil is not grounded.

b—If lamp burns, coil is grounded.

Test Cabinet

A test cabinet containing a rotary switch, lamp receptacle, and fuse holder is conveniently located near the main distribution panel in all stores of a large cafeteria chain. It is used for testing lamps and fuses and saves considerable time for the visiting maintenance man.

TEST CABINET for checking fuses and lamps is conveniently located near the main distribution panel.

MIDGET TRIPLOC

A new line of plugs and receptacles, smaller, lighter weight, yet retaining many heavy duty features of the regular Triploc line.

PYLETS

. . . the improved heavy duty conduit fittings

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MARTIN *Portable* VISE STAND and PIPE BENDER

Sets up in a half minute and *stands without hitching*

Here is a genuine time-saver for cutting or threading conduit up to 2½". Bending capacity ¾". Carry the Martin Vise Stand and Pipe Bender on the job — it's *really* portable. Write for complete details and prices.

Also made in a larger size—4½" vise capacity with 1" bender capacity.

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The old arm and hammer method is slow, hard and expensive. Use the Wodack "Do-All" Combination Electric Hammer and Drill and drill 15 times as fast in concrete and masonry. Two tools in one. With hammer member removed it's an electric drill with ½" chuck. Cuts cost of drilling for expansion anchors. Universal motor 110 or 220 v. Ask for Bulletin.

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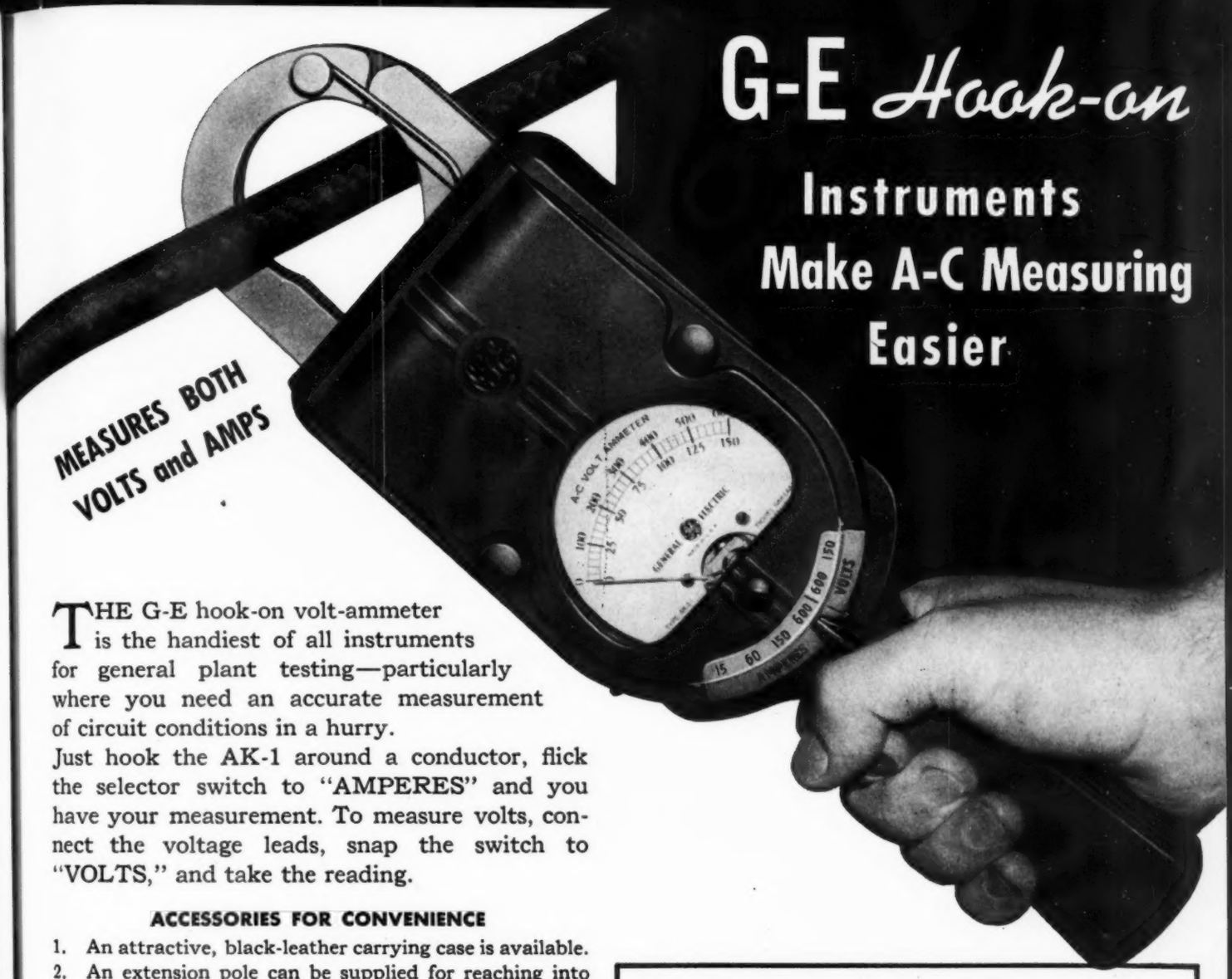
Phone AUSTIN 9866

G-E *Hook-on* Instruments Make A-C Measuring Easier



THE G-E hook-on volt-ammeter is the handiest of all instruments for general plant testing—particularly where you need an accurate measurement of circuit conditions in a hurry.

Just hook the AK-1 around a conductor, flick the selector switch to "AMPERES" and you have your measurement. To measure volts, connect the voltage leads, snap the switch to "VOLTS," and take the reading.

ACCESSORIES FOR CONVENIENCE

1. An attractive, black-leather carrying case is available.
2. An extension pole can be supplied for reaching into inaccessible places and for additional protection on high-voltage circuits.
3. Voltage leads are included with each instrument.

AND A LOW-COST HOOK-ON RECORDER FOR CONTINUOUS RECORDS

For trouble investigations and maintenance—where a permanent record of a-c circuits is needed—this G-E hook-on current-measuring set is ideal. It consists of a Type CF-1 recording ammeter and a split-core current transformer.

IT'S INKLESS—ready to go at a moment's notice—no inkwell to fill, no pen to start, and no ink to spill and blur the record.

The set is simple to use—just connect the CF-1, close the jaws of the transformer around a conductor, and it starts to record. The instrument operates without attention and has a 30-day chart length. Timing of the chart drive is accurately controlled by a Telechron motor.

Type CF-1 inkless recording voltmeters are also available.

For further information on the hook-on voltammeter, ask for Bulletin GEA-2950; on the recorder, GEA-3187. Your G-E office has copies, or write to General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

602-20

Estimating

REROUTING SUB-MAIN FEEDER

Alterations in a midwest factory necessitated the removal of an electrical sub-main feeder consisting of a 2½-inch conduit with three No. 3/0 rubber covered cables. The overall length of the circuit was 140 feet and the run was relatively straight, containing three elbows and no pull boxes. The conduit was mounted on brick walls and passed through brick partitions at two points.

The contractor's job was to remove the present cable which was recently installed, carefully check it for abrasions, remove and reroute the conduit and pull in the same wire. Since work of this type comes up from time to time in factory modernization, the contractor kept an accurate record of the time required to remove the present feeder. This is to be used as a reference for similar work in the future.

The recorded labor breakdown is as follows:

REMOVING CABLE—includes carefully removing the cable from the conduit and coiling it on reels so it could be reused. This operation required two men on a manually operated winch and one man at the reels to coil the cable.

Total time ..... 10.0 m. h.
Average time per circuit foot 0.0714 m. h.

REMOVING CONDUIT—includes breaking the bolts holding the one hole conduit straps, cutting the conduit at four points where it passed through the two walls and taking down the conduit.

Total time ..... 9.0 m. h.
Average time per foot..... 0.0643 m. h.

Data from Continental Electrical Construction Company, Chicago, Ill.

WIRE IN SQUARE DUCT

This cost data analysis covers installing medium sized sub-feeder wires for industrial power distribution in a 4-inch square raceway system. The raceway was installed in 5-foot sections and is continuously accessible through hinged covers.

The duct system was suspended on hangers to 13 feet above the floor. Wire was fished in conventionally, the problem being to pull wires by the duct joints and fittings. As the system can be opened at any point there is no problem of friction.

Wires are looped through at elbows and junction boxes where these form square corners. The smaller wires work in very easily but the larger conductors require more time than a conventional pull.

Analysis of the labor hour figures on installing these wires works out as follows:

Total time—206 man hours
Wire list and breakdown

1900 ft., No. 6	22 man hours
8500 ft., No. 2	155 man hours
380 ft., No. 4/0	11 man hours
240 ft., No. 350000 CM	18 man hours

Giving man hours per 100 feet (slide rule calculations)

No. 6	1.16 per 100 ft.
No. 2	1.82 per 100 ft.
No. 4/0	2.90 per 100 ft.
No. 350000 CM	7.50 per 100 ft.

The above figures include supervision. Wires were delivered at the job and as all work was in the clear on one floor, there was little lost time.

Data from A. C. Electric Co., Milwaukee, Wis.

***HAPPY SMILE** brightens the countenance of J. A. Nettleton, partner in the Eastern Electric Construction Co., Bridgeport, Conn. The reason—his company is being kept busy working on plant expansions in industries vital to the national rearmament program.*

INSTALLING A LARGE SWITCHBOARD

A New Jersey electrical contractor was recently awarded a contract covering the installation of a ten section, 4 kv. metal clad switchboard. The board was 20-ft. 4-in. long, 7-ft. 8-in. high, 4-ft. 9-in. deep and had a total net weight of 16,990 pounds. It's ten sections included two incoming feeder sections, each with a metering panel; one synchronizing section and five 4 kv. sections for outgoing feeders.

The location of the board in the building was inaccessible from any roads or driveways. Since the customer was to provide for shipment of the switchboard to the plant property line only, it was up to the contractor to move it to the installation site.

The nearest point to which a truck could get was about 130 feet from the building. And this, the best and shortest path, was obstructed by five 12-inch pipe lines resting on the surface of the marshy ground.

The board shipped in these sections:

Section No. 1—7-ft. 6-in. long—shipping weight, 5,581 pounds.

Section No. 2—5-ft. 6-in. long—shipping weight, 6,457 pounds.

Section No. 3—7-ft. 4-in. long—shipping weight, 7,368 pounds.

Arrangements were made with the manufacturer to retain the detachable handling channels used in the plant to hoist the board sections from place to place. Provisions were also made, before delivery of the board, to have sufficient planking, blocks, tackle, rollers, hydraulic jacks and necessary auxiliary equipment for unloading and moving the board. The board was delivered on two trucks, sections 1 and 2 on truck No. 1 and section 3 with all the accessories on truck No. 2.

The following is the accurate labor breakdown for unloading, moving and assembling the switchboard.

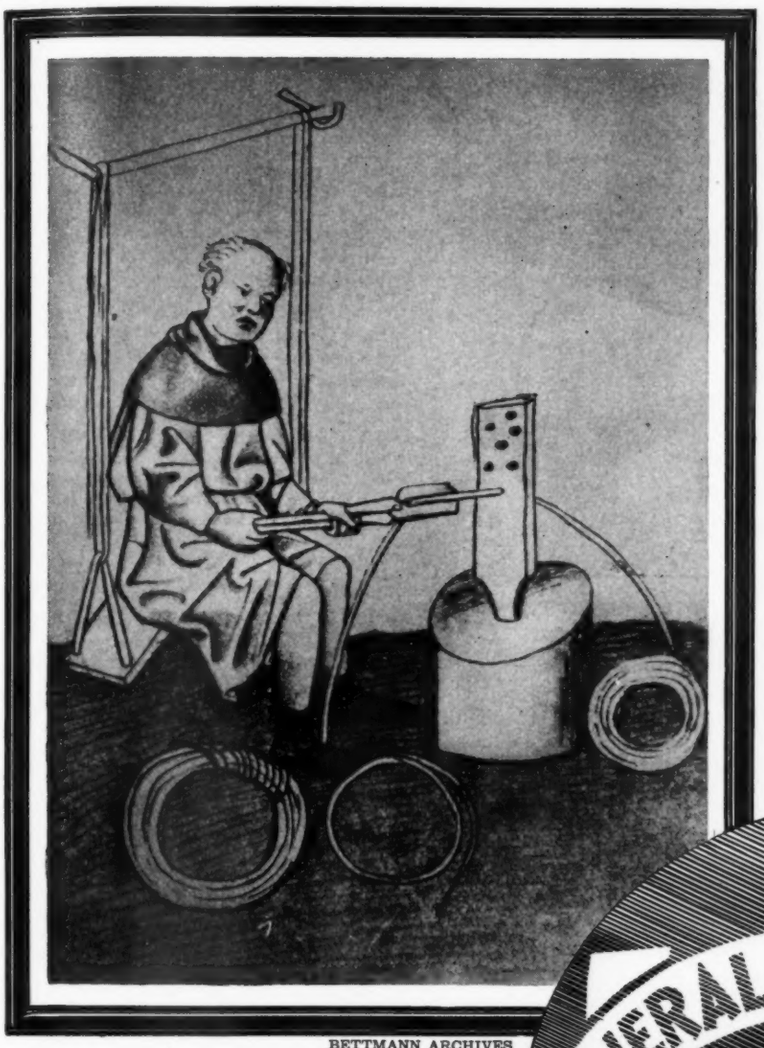
LABOR REQUIRED TO INSTALL BOARD.

ERECTING WOOD SKIDS—includes the erection and blocking of approximately 600 feet of planking from the truck to the switchboard location, 130 feet away. Careful blocking was required to keep the planks clear of the 12-inch pipe lines. Some of this time was also consumed in unloading from truck No. 2, the accessories consisting of eight oil circuit breakers, circuit breaker oil, batteries, charger, test racks and miscellaneous wiring materials. Three men erected the skids and three unloaded these accessories.
Total time ..... 12 m. h.

UNLOADING SWITCHBOARD—includes the unloading of the three sections of board from the two trucks to the skidway. Six men were required.

Total time ..... 9 m. h.
Average time per section..... 3 m. h.

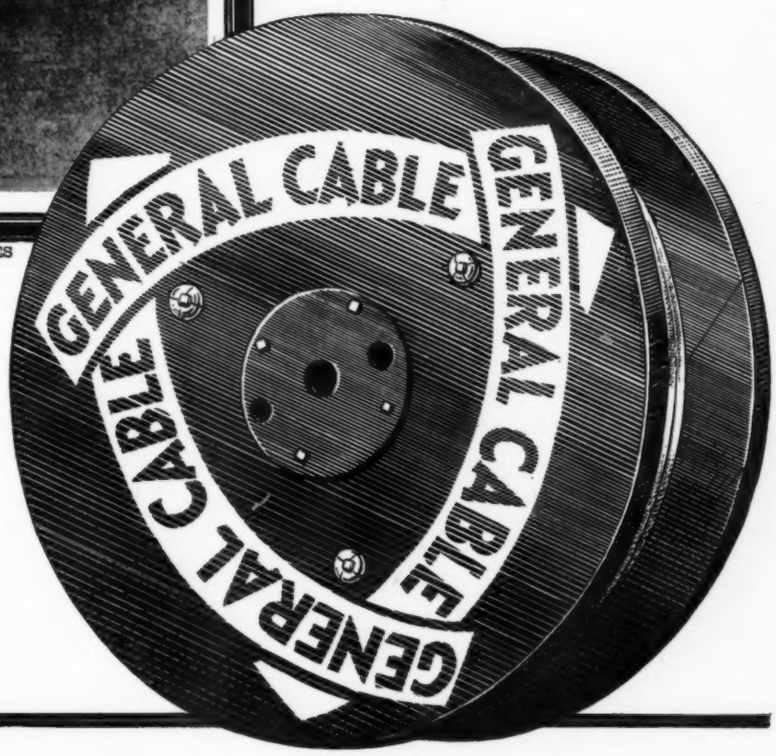
MOVING SWITCHBOARD—includes moving the switchboard sections on rollers over the



BETTMANN ARCHIVES

From a painting preserved since 1450, and now in the Municipal Library at Nuremberg, we have this record of man's primitive ingenuity in wire drawing. Note how the worker, in a swinging seat, is expected to use the thrust of sturdy legs to draw the wire through the progressively smaller holes in the die-block.

AGAINST 500 YEARS of recorded wire-drawing history, General Cable's 50-odd years seem brief indeed. Yet in them has been encompassed the entire development of insulated wires and cables for electric power distribution. In product research, as in manufacturing skill and plant resources, General Cable continues in the forefront.



GENERAL CABLE

BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE

STOCKED BY ELECTRICAL WHOLESALERS EVERYWHERE

General Cable Corporation Sales Offices: ATLANTA · BOSTON · BUFFALO · CHICAGO · CINCINNATI · CLEVELAND · DALLAS · DETROIT · HOUSTON KANSAS CITY (MO.) · LOS ANGELES · NEW YORK · PHILADELPHIA · PITTSBURGH · ROME (N.Y.) · ST. LOUIS · SAN FRANCISCO · SEATTLE · WASHINGTON (D.C.)

New!

BURNDY VERSI-LUG

FOR CONNECTING CABLES AT ANY ANGLE

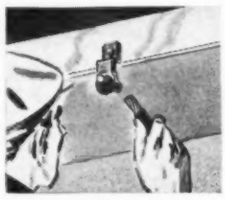
"Need some lugs in a hurry!" cried the breathless electrician. "Emergency job — power off at the mill. Our 500 Mcm cables come in at different angles, and we don't have enough room to bend them. What've you got?"

• Burndy's new VERSI-LUG filled the bill. This versatile connector takes conductors at *any* angle, accommodates a wide range of conductor sizes . . . *and does the job in a hurry!*

It's an amazing new idea in connectors, which makes one connector do the job of many . . . cuts way down the number of different connectors necessary for a job . . . is invaluable in emergencies.

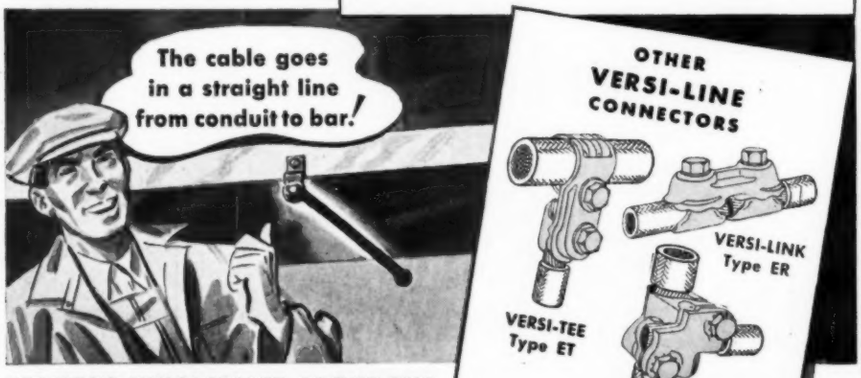
"NOT A MINUTE TO SPARE! Production's being held up until the job's finished, so I'll have to work fast . . . This Versi-Lug looks neat.

"THE LUG'S COMPACT, not much bigger than the cable. Nice machining, too. Screw cap works like a charm and surfaces are well finished.



"SAY, THAT WAS EASY. Just revolve the cap in the socket till I get the right angle. Now, the cable slips into the cap and rests securely on the grooved rim of the socket.

"QUICK AS A WINK! Tighten up the cap screw with a wrench and the connection is completed. It's really a cinch! The fastest job I ever did, and neat too!"


The cable goes in a straight line from conduit to bar!
OTHER VERSI-LINE CONNECTORS
VERSI-TEE Type ET
VERSI-LINK Type ER
VERSI-TAP Type QPX

SEE YOUR WHOLESALER ABOUT THE

Burndy VERSI-LINE

BURNDY ENGINEERING CO., INC. • 459 EAST 133rd STREET • NEW YORK CITY

Estimating

[FROM PAGE 64]

plank skidway, 130 feet to the building. Hydraulic jacks were used to raise the sections to ease them over the pipe lines. Six men were required for each section.

Total time	36 m. h.
Average time per section	12 m. h.

UNCRATING SWITCHBOARD—includes the removal of the protective crating and covering on each unit. Six men were used.

Total time	18 m. h.
Average time per section	6 m. h.

INSTALLING HANDLING CHANNELS—includes the mounting of two 8-foot pieces of 6-in. channel on each unit. These were provided by the manufacturer to facilitate setting the board. Six men were used, two on each unit.

Total time	6 m. h.
Average time per unit	2 m. h.

SETTING SWITCHBOARD—includes raising, moving and lowering the sections over anchor bolts precast in the floor slab. Hydraulic jacks were used under the handling channels to raise the board. Six men were used on each unit.

Total time	36 m. h.
Average time per unit	12 m. h.

ALIGNING THE BOARD—includes loosening all section bolts, installing necessary shims and retightening section bolts to properly align the complete board. Three men were used.

Total time	12 m. h.
Average time per section	4 m. h.

ANCHORING THE BOARD — includes the installation of necessary washers and tightening nuts on all anchor bolts.

Total time	3 m. h.
Average time per section	1 m. h.

CONNECTING BUS BARS—includes the installation of nine bus bar "A" clamps to join together the bus bars of the three sections.

Total time	6 m. h.
Average time per section	2 m. h.
Average time per clamp	0.667 m. h.

WIRING CONNECTIONS—includes replacing approximately 60 small wiring interconnections, removed to ship the board in the sections specified. All connections were clearly tagged for identification. Two men were used.

Total time	8 m. h.
Average time per connection	0.134 m. h.

INSTALLING BREAKERS — includes unpacking, filling with oil, testing, and installing eight 400-ampere, 3-pole, dropout type oil circuit breakers. Two men were used.

Total time	12 m. h.
Average time per breaker	1.5 m. h.

REMOVE RIGGING — includes the removal and loading on a truck of all planks and rigging used on the job. Four men were used.

Total time	4 m. h.

COMPLETE INSTALLATION — includes the sum total of all the time, given above, necessary to install the complete switchboard from truck to test.

Total time	162 m. h.

Data from E. J. White Company, Newark, N. J.

WESTINGHOUSE supplies the answer

On all Westinghouse 100-watt fluorescent fixtures, reflectors are completely detachable from the hood by means of a simplified thumb-locking arrangement.

Two-piece Construction Speeds Up Installation of Fluorescent Units

Westinghouse 100-watt fluorescent lighting fixtures not only provide higher levels of industrial illumination, but save valuable time during installation and maintenance.

With lamps removed, an easy quarter turn of two tension-locked thumb latches releases the reflector from the hood, making auxiliary equipment readily accessible. This time-saver, an exclusive locking system, permits attaching and removing the reflector without disturbing line connections. All wiring, fluorescent ballasts, starters and lamp sockets are mounted in the hood.

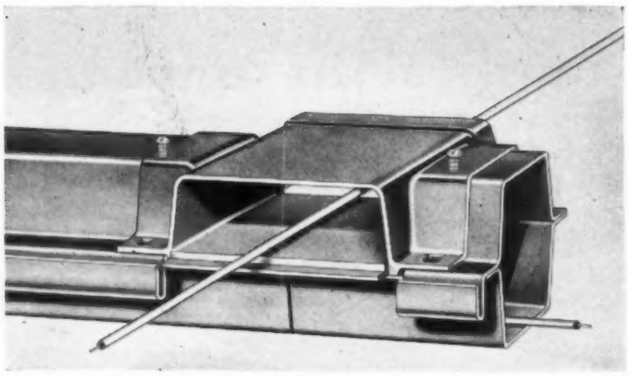
Four 100-watt, porcelain-enameled reflector types fit the one 100-watt fluorescent hood. The RLM unit shown above is available with or without diffuser openings in the top of the reflector for ceiling illumination. Similarly, two units with open reflector ends are also available.

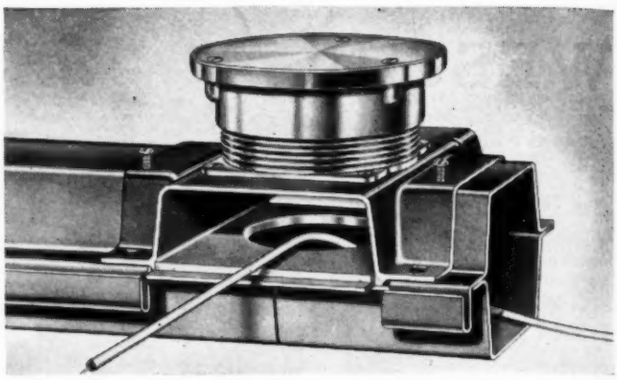
Call your nearest Westinghouse Lighting Distributor, or write Westinghouse Electric & Manufacturing Co., Edgewater Park, Cleveland, Ohio, for Catalog Section 61-152.

117 Westinghouse Electric Supply Company Offices and Independent Lighting Distributors provide local stocks and service.

Westinghouse Lighting Equipment

For Unlimited Raceway Capacity [FROM PAGE 16]





FEATURES OF *header fittings show method of wiring cells. (a) left, Access header section; (b) right, crossover header section. Wiring area is determined by header cross-section.*

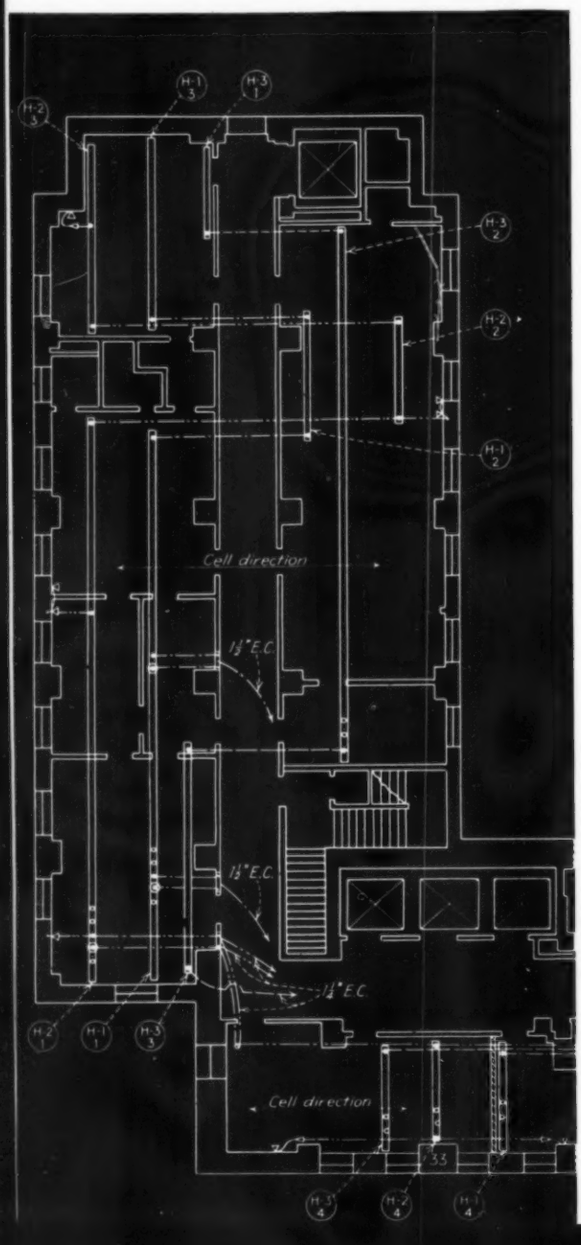
cells are based on 40 per cent of the internal cross sectional area. Practically, the area of the header is the limiting characteristic. A top side header has a cross sectional area of 6 sq. inches or 2.4 sq. inches available under the 40 per cent rule. Common design practice provides headers from 75 to 100 feet apart with separate ones for power, telephone and signals.

For estimating cellular floor work, the manufacturer provides the electrical contractor with a detailed bill of material and prices. Labor unit data is not generally available to the trade but is released by the manufacturer to the individual bidders with the material quotation. Factory engineers cooperate with the bidders in preparing the cost survey on work installed in floors.

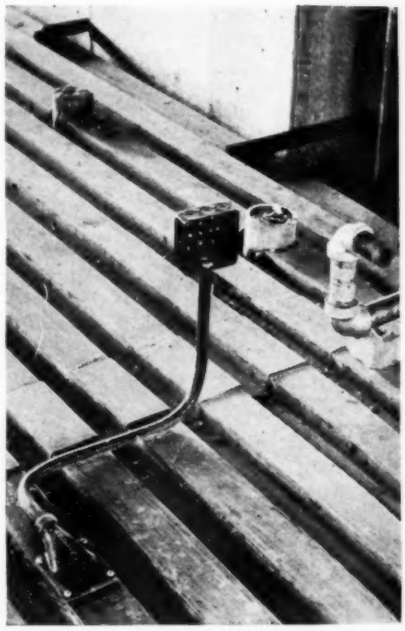
Some advantages in job handling are claimed for cellular steel floor jobs. The electrical contractor need not start his crew until all of the floors are laid. He can then operate with a steady crew and set his own pace. Feeding lighting circuits from the floor and the elimination of floor conduits prevents most of the conflicts with other trades. The only critical cooperation schedule needed is during the erection of partitions, walls and furring around the columns.

At Burdine's Department Store in Miami, Fla. the George LaVigne Electric Co. installed the electrical components of a Roberston Cellular Steel Floor system. Some of the accompanying photos were taken on this job. It was this contractor's first cellular floor job. He reports ". . . installation of fittings is very simple . . . no difficulty in pulling wires . . . added a number of additional floor outlets . . . at small cost without disturbing the completed building.

On this installation the feeder system was conventional. Panelboards fed into the cell headers. Circuits for the lighting system were picked up from the cells at columns and extended in conduit to the outlets above. The cells were alternately high and low tension.



DISTRIBUTION PLAN *gives cell direction, location of headers and access points. H-1 is telephone; H-2, signal and H-3, power headers. Plan is portion of third floor, Federal Office Building, New Orleans.*

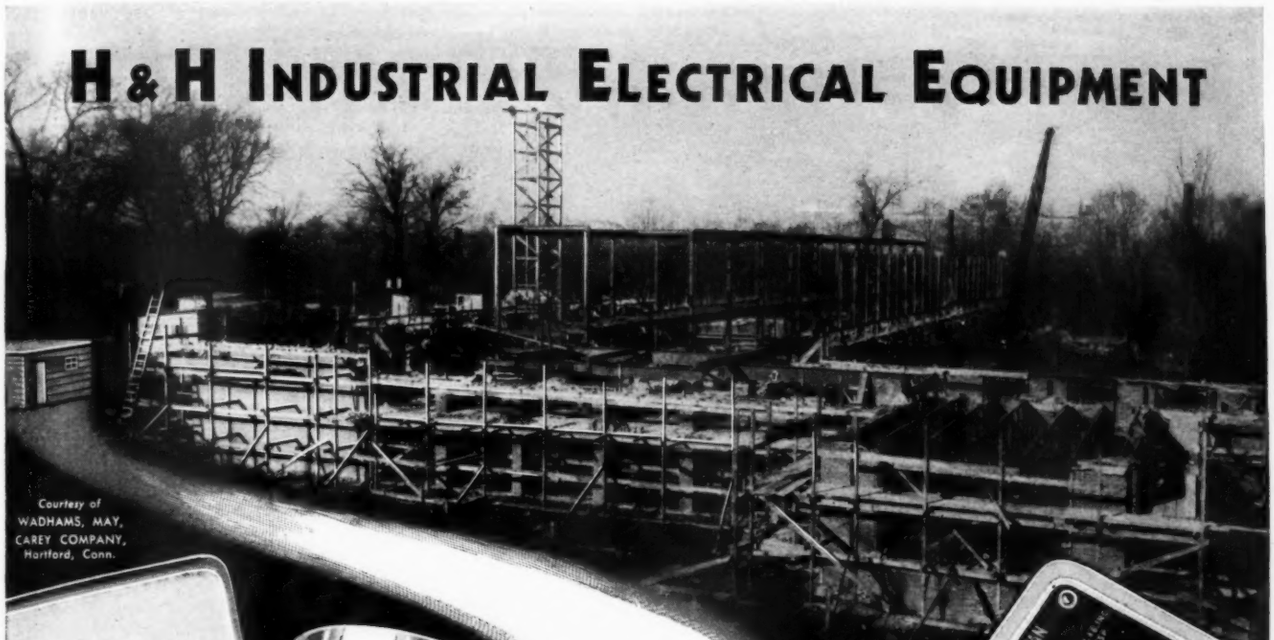


PARTITION OUTLETS *are piped into nearest power duct through flat connector. At Federal Land Bank Building, Baltimore, Maryland.*

An example of the flexibility of the cell system is provided by an alteration required after the building was occupied. The sewing machine department, requiring several outlets, was moved from the second to the fifth floor. Eight floor outlets for power and one for telephone were installed and wired by an electrician and helper in five hours.

Under commercial demands for wiring accessibility and systems which permit simple alterations, the trend toward structural raceways is probably going to grow. Other similar systems will inevitably come over the horizon. The problem of trade jurisdiction may arise in installation. But the critical work finally will go to the trade best equipped by tooling and skill to do it. This will be the electrical contractor.

H & H Industrial Electrical Equipment



Courtesy of WADHAMS, MAY, CAREY COMPANY, Hartford, Conn.

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NEW BUILDING to meet industrial shortages . . . plant expansion for rearmament programs . . . this is the way to profitable wiring contracts. And the road to these orders is *lined* by H & H Industrial Devices. Here are typical wiring items for heavy-duty service, power and light:

Left side, first above, Weatherproof Switch, Weatherproof Receptacle. Second, Type C Ceiling Pull Switch. Third, 3-wire Rubber Cord Connector. Fourth, Type C Tumbler Switch.

Right side, first above, Small Motor Starting Switch. Second, 3-wire Receptacle with Rubber Plug. Third, 2-wire 20 Ampere Duplex Receptacle with cord grip Cap. Fourth, 3-wire Flush Receptacle with Cap.

* * *

Most all new buildings (and modernizations) will be *adequately* wired for maximum production and convenient power connections. Your H & H Line is *more* than adequate; it's the line that leads to the ORDERS.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

Questions ON THE Code

Answered by
F. N. M. SQUIRES
Chief Inspector New York Board of Fire Underwriters

Fixtures In Conductive Location

Q. *"Please refer to Article 410, Section 4105 Ungrounded Fixtures, in the 1940 National Electrical Code. Does a condition where a porcelain lamp holder, pull chain type, installed on a wall directly over sink in kitchen, come within the scope of this clause and should the metal chain be provided with an insulating link?*

"Condition—A porcelain lamp holder, pull chain type, is installed on a ceiling with a 7 ft. 11 in. ceiling height, with the end of the chain reaching within 7 ft. 4 in. of the floor. The room is a utility room off the kitchen in an U. S. Housing Job; said utility room having a hot water tank suspended from the ceiling, coal furnace and miscellaneous other piping on the ceiling. The metal chain on fixtures is provided with a cord for operating same. Does this condition come within the scope of this clause and is insulating link necessary in the pull chain of the fixture."

—M.A.E.

A. Section 4105 very clearly states that *ungrounded metal* fixtures or lamp holders shall not be installed within reach of bathtubs, shower baths, plumbing fixtures, steam piping or other grounded metal work. The Code, therefore, permits *grounded metal* fixtures and lamp holders or non-metallic fixtures and lamp holders in such locations. Of course the fixtures and sockets of insulating material will be much safer.

But the last sentence of Section 4105 very definitely requires that all metal pull chains used in such locations be provided with insulating links. Therefore, the porcelain lamp holder would be permissible in the Utility Room but the pull chain would have to have an insulating link.

Separation Between Conduit and Steam Pipes

Q. *"It seems to me that the National Electrical Code at one time had a note on how far electrical conduits (that is metal conduits) should be kept from steam piping. I cannot find it in the 1940 Code."*—D.J.C.

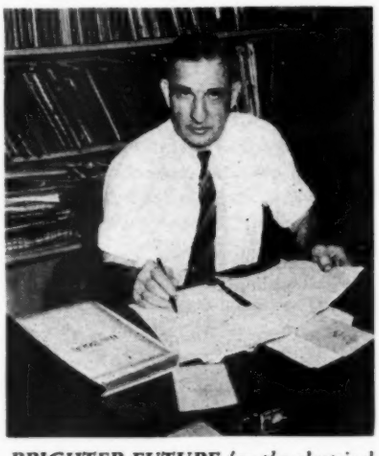
A. The National Electrical Code does not now give any rule relative to a required distance which must be maintained between electrical conduit and steam pipes, nor is any such requirement recalled in former issues of the Code.

This matter must be treated with respect to the temperatures to which the conductors within the conduit may be subjected.

Any heat which may be added to the conductors which results in temperatures of over 30° C (86° F) will reduce the allowable carrying capacities of the wires in accordance with the temperature correction factors which are at the bottom of Table 1 (page 301) of the 1940 Code.

And of course excessive temperatures hastens the deterioration of insulations. As an example of the next to the last paragraph above, if we had a feeder of three No. 6 wires in a conduit at the normal room temperature of 30° C, the carrying capacity of the No. 6 wire would be, for Type R wire, 45 amperes; but if the temperature of the wires was raised by the proximity of steam pipes (or other heat) to 45° C (113° F) the carrying capacity would be only 50 per cent of the 45 amperes or only 22½ amperes.

But if the temperature of the wires in the conduit is raised to 50° C (122° F) the carrying capacity of the type R wire (and any type R wire) is reduced to zero.



***BRIGHTER FUTURE** for the electrical contractor because of fluorescent lighting and the new small diameter wire, is predicted by T. F. Flynn, president of Flynn Electric Company and head of the local contractor group in Bridgeport, Conn. Mr. Flynn is now using the new wire to alleviate overloaded conditions on old apartment house subfeeders.*

Switches In Bathrooms

Q. *"Is there a ruling that prohibits the placing of toggle flush mounted switches in bathrooms if the switch handle and cover plate are of insulating material such as brown bakelite commonly supplied to the Trade?*

"Also does the size of the bathroom make a difference (as if whether there is room to mount switch out of reach of persons using the tub or shower)? I am told that the old Code stated that unless there was at least 5 feet clearance between tub and switch, that it must be placed outside the bathroom door, even though the switch handle and plate are of suitable insulating material."—I.C.S.

A. The Code does not prohibit placing snap switches in bathrooms and does not *prohibit* the use of switchplates of insulating material.

Section 3809 of the Code states that "flush snap (toggle) switches, if mounted in ungrounded metal boxes and located within reach of conducting (wet or of metal) floors or other conducting surfaces, shall be provided with covers of non-conducting materials." This means that in such conducting locations the switch boxes, if of metal, shall be grounded or shall have covers of insulating material. It does permit the use of boxes of insulating material which according to Section 3716 may be used on open wiring on insulators, concealed knob and tube wiring,

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CURTIS *Fluorescent* INDUSTRIAL TWO-LAMP UNITS

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Knockouts in channel end plates make long runs simple and economical

Attractive crackled grey finished housing of heavy zinc plated steel

Correct spacing between lamp centers for coolness and increased efficiency

Snow white FLURACITE reflector with V shaped center section provides more light on working plane

Lamp starter sockets on side permit easy replacement without touching lamps or reflector

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TWO NEW TWIN-LAMP WHEELER RLM FLUORESCENT UNITS

For the New 60", 100-Watt Type F Lamps

These new Wheeler RLM Fluorescent Lighting Units are designed and manufactured to conform with the rigid specifications established by the RLM Standards Institute.

Units are available in the following styles:

1. **A standard RLM Unit, without apertures.**
2. **An RLM Diffuser Unit with apertures to allow some light emission to the ceiling, thereby eliminating sharp contrasts between ceiling and working plane.**

These larger size Fluorescent units, when installed at the conventional 10′ spacing and mounting heights, furnish the higher levels of illumination so essential to many manufacturing requirements. Also, in locations where the ceilings are higher than average these new units will provide adequate levels of illumination.

RLM Units are recommended for use with the new 3500° K White Fluorescent Lamp, and can be used in any industrial locations where efficient high level illumination in required. They are extremely efficient, cooler in operation, easily installed, and easily serviced. The units, which employ two 100 watt, 60" Fluorescent Lamps are supplied complete with high power factor Tulamp ballasts for either 110-125 volt, 199-216 volt, or 220-250 volt operation. All units are supplied complete with Mogul Bipin Twist-turn lamp holders and removable starter switches.

The total wattage consumption of these units when equipped with two lamps will be approximately 235 watts.

Unit features:

Shielding angle of 14 degrees.

Porcelain Enamel reflecting surface with reflection factor of 79%.

Light output efficiency of 75%.

Corrected for power factor and flicker.

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WHEELER REFLECTOR COMPANY

275 CONGRESS ST., BOSTON, MASS.

NEW YORK ATLANTA CLEVELAND

Questions on the Code

[FROM PAGE 70]

non-metallic sheathed cable and non-metallic waterproof wiring.

There is nothing in the Code now which requires placing the switches out of reach of the bath tub or shower bath or outside the bathroom door.

Number of Fuses

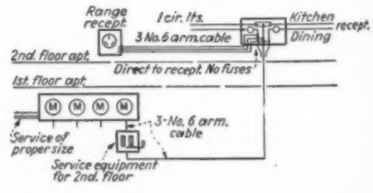
Q. *"Are three fuses required on 2-phase 3 wire-system for power?"* —M.H.

A. Sections 4326 and 4345 requires that where fuses are used for motor-running and for motor branch-circuit protection, a fuse shall be placed in each ungrounded conductor. The same requirement holds for motor-feeder protection.

Where overcurrent devices other than fuses are used they shall open all ungrounded conductors and shall have at least two overcurrent units, one in each phase except in the common wire.

Connection of Range

Q. *"Can the feeder from the service equipment to the distribution panel be used to also supply current to the range without fuses, other than the service fuses as shown in the diagram below?"*—O.A.T.



A. No, the arrangement shown above is NOT correct. The feeder shown is a feeder only and cannot also be used as a branch circuit.

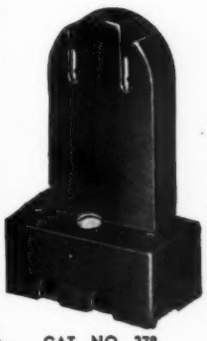
Section 4222 requires that every appliance shall be supplied by a branch circuit. Therefore there must be a protective device (fuse or circuit breaker) provided to separate the range from the feeder. As the wires from the panel to the range are of the same size as the feeder, this protective device can be located anywhere between the range and the panel. The logical place is, of course, at the panel.

This protective device must not have a rating of over 45 amperes in order to protect the No. 6 circuit wires and if the range has a rating of less than 30

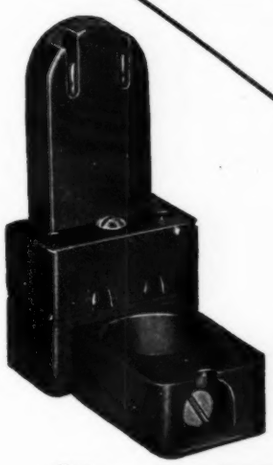
LEVITON

These are but a few of the fine Leviton wiring items produced by Leviton for residential, commercial and industrial work. You will find them all good profit makers . . . your end of their up-to-the-minute design and manufacture in Leviton's modern plant.

Have you seen Leviton's latest devices? Ask your wholesaler to show them to you. Or, if more convenient, drop us a line, and we will gladly send a sample and complete details on any item you may wish.



CAT. NO. 379



CAT. NO. 381

All types of Fluorescent fixture devices—push in type—sturdy construction and easily mounted. Can be mounted with either 2 screws or with 1 screw as shown.

CAT. NO. 380

CAT. NO. 689

CAT. NO. 720

CAT. NO. 572

PULL CHAIN CANOPY SWITCHES

Rated 3A-250V, 6A-125V T (T rated for Type C loads)
These switches are made in Single Pole, two circuit and two speed types and are adapted to fit low canopies. The body of the switch is only 1 3/16 inches in diameter by 1 inch overall height, and contains a very fine accurate snap action mechanism. Can be used on Fluorescent Fixtures or appliances requiring this high rating.

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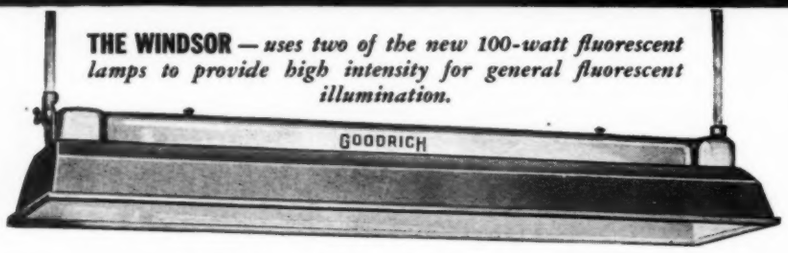

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CERTIFIED BALLAST EQUIPMENT. Fluorescent lamp manufacturers guarantee lamps for maximum life and best performance only when this certified auxiliary equipment is used.

UNDERWRITERS' LABEL shows that the fixture meets the highest safety requirements, both electrically and mechanically. This is a necessary protection for you.

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BETTER SUSPENSION. Weight of fixture is carried by steel flanges at ends, instead of by top of sheet steel hood. Thus, hood can't "spring" or warp. Mounting brackets are adjustable so reflector may be tilted to various angles. Simple bridge mounting of electrical equipment eliminates many screw heads on reflecting surface; protects finish against chipping. Write for literature.

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Questions on the Code

[FROM PAGE 72]

amperes the rating of the protective device must be less than 45 amperes. (See Section 2173.)

The service fuses to protect the No. 6 wire feeder must not exceed 45 amperes if type R wire is used.

Limitations on Wires In Outlet Box

"In regards to rule 3705a of 1940 Code relative to the maximum number of wires allowed in outlet boxes, it states 'where a fixture stud, cable clamp or hickey is contained in the box, the number of conductors permitted shall be one less than shown in tables.'"—F.R.B.

Q. *1—"Suppose a 3¾-in. or 4-in. by 1½-in. octagon box had a fixture stud, 2 cable clamps and a hickey in the outlet box, how many wires less would this be than that shown in the table?"*

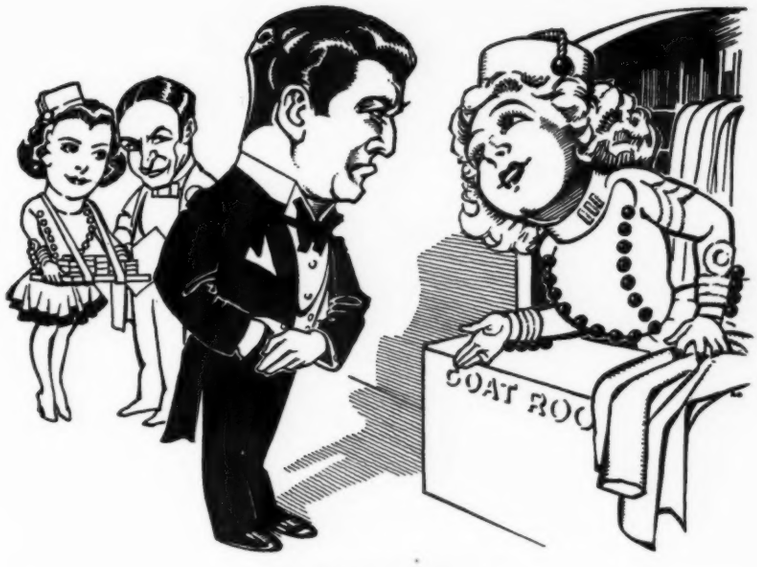
A. 1—The fixture stud, hickey and the two cable clamps would probably not occupy more than two cubic inches of space in the box when all were taken together. Therefore the inclusion of these in a box would reduce the number of wires permitted in the outlet box as shown in the table of Section 3705a by one. That is, in the 3¾-in. octagonal box with the clamps, stud and hickey, four No. 14 type R wires would be permitted and in the 4-in. box seven wires would be permitted.

Q. *2—"Most of the contractors use switch boxes (with knockouts) for the wall brackets when wiring houses. How many No. 14 type R wires would be allowed in a box 1¾-in. by 2¾-in. by 3in.?"*

A. 2—If armored cable connectors and fixture bars were used and thus there were no cable clamps nor fixture studs in the boxes, then according to the table, seven No. 14 type R wires would be permitted. With cable clamps and fixture studs, only six would be permitted.

Q. *3—"Rule 3011 states that, 'at least 6 inches of free conductor shall be left at each outlet for the making up of joints on the connection of fixtures.' Would this have any bearing on this rule (3705a)?"*

A. 3—The 6 inches of free ends required by section 3011 would have no bearing on Section 3705a.



CHECK

needless interruption before it starts, and keep in circuit without waste of time and money. Use

THERM-A-TRIPS

Therm-A-Trips end unnecessary fuse blowing on refrigerators, washing machines, and other electrical appliances. They give the fullest protection to the circuit and its equipment at all times and under all conditions, without interrupting safe operation at any time. They are the most complete, most flexible, most economical protection you can use on a circuit.

A Therm-A-Trip combines a fuse with a thermal cutout. The fuse blows on short circuit, but will withstand a normal increase in starting current. The thermal cutout gives full protection against sustained excessive overloads. No other overload protection is needed.

Use Therm-A-Trips for individual motors, and on circuits having motor-driven apparatus. Plug type, 125 volt; cartridge types, 250 and 600 volt. For full information ask your dealer or write for our Bulletin 405.

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MAKERS OF ELECTRICAL PROTECTIVE EQUIPMENT SINCE 1893

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PUBLISHED BY THE ELECTRICAL DIVISION OF COLT'S PATENT FIRMS

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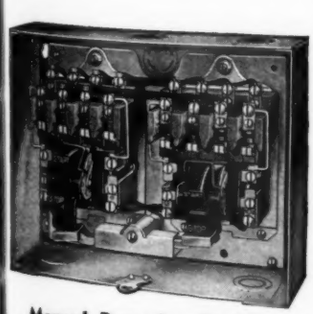

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1 Folders GEA-1542D and 18688 illustrate and describe heavy-duty d.c. motors. General Electric Co.

MOTOR CONTROL

2 A 36-page booklet, Pub. CS-151, features the new development in motor control engineering, known as Unitrol. Cutler-Hammer, Inc.

WIRE CALCULATOR

3 A building wire calculator which gives information on various types under the new National Electrical Code. General Cable Co.

LUMINAIRES

4 Folder F-8506 describes the CL-160 four lamp semi-indirect fluorescent luminaire for use in offices, schools, stores or public buildings. Westinghouse Electric & Mfg. Co.

LIGHTING

5 Catalog illustrating and describing fluorescent lighting fixtures for commercial and industrial use. A. L. Smith Iron Co.

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6 Bulletin No. 108 outlines the new "Autophone" system of automatic telephones, designed for industrial plants, offices, institutions, residences and other buildings. S. H. Couch Company, Inc.

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7 Circular 500 illustrates and describes electrically operated switches, including automatic transfer and remote control switches; contactors and relays. Automatic Switch Co.

CIRCUIT BREAKERS

8 Descriptive data 33-600 consists of 8 pages, and covers type B line of oil circuit breakers designed for indoor industrial and central station use. Westinghouse Electric & Mfg. Co.

MOTORS

9 Bulletin 119 features Type AA induction motors, squirrel-cage, for two and three-phase a.c. circuits. Reliance Electric & Eng. Co.

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10 Folder GEA-3569 illustrates and describes new push-button stations for standard duty. Dimensions, types and markings are given. General Electric Co.

WIRES AND CABLES

11 A 36-page book featuring rubber covered wires and cables and service entrance cables. Many tables are included. John A. Roebling's Sons Co.

SOLDERING IRON

12 A 4-page folder illustrating and describing soldering tools and featuring the new quick heat No. 3 electric soldering iron. Ideal Commutator Dresser Co.

VOLTAGE REGULATORS

13 Bulletin No. 51-2, consisting of 20 pages of illustrations and descriptions on the complete line of Type "TH" Transtat voltage regulators. Also contains a 9-page technical article with 26 circuit diagrams explaining methods of connecting regulators for various applications. American Transformer Co.

FLUORESCENT LUMINAIRES

14 A 4-page folder, F-8504, describing commercial fluorescent luminaires for commercial building interiors. Westinghouse Electric & Mfg. Co.

GLOBES

15 A pocket-size folder illustrating and describing exit and sign globes. Kopp Glass Incorporated.

DISTRIBUTION SYSTEM

16 Bulletin 403 illustrates and describes flexible light and power circuits for industrial plants and commercial buildings with BUStribution duct. Bull Dog Electric Products Co.

LAMP LOCK

17 A folder featuring the Laduby lamp lock, a devise for locking electric light bulbs. Laduby Company.

SWITCH

18 Folder GEA-2234C gives data on manual motor-starting switch CR1061, designed for use with fractional horsepower motors. General Electric Co.

LAMP GUARDS

19 A folder illustrating and describing Loxon and Gripon lamp guards. McGill Manufacturing Co.

DRYING LAMPS

20 A 12-page illustrated booklet, A-3817, on how to apply radiant heat lamps to industrial drying, baking and heating tasks. Westinghouse Lamp Division.

INSTRUMENTS AND SWITCHES

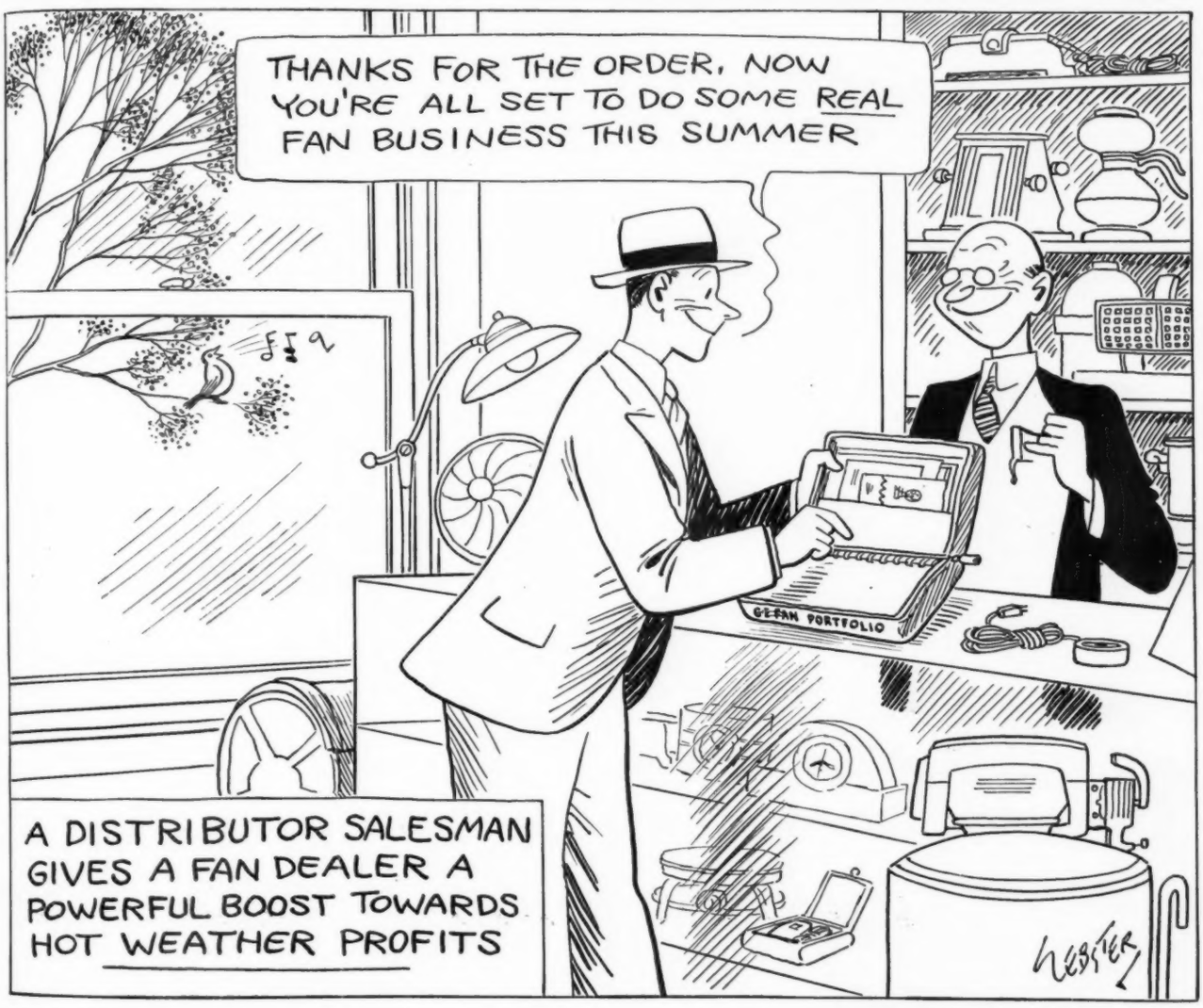
21 Bulletin GEA-2753 is entitled "G-E Instruments and Time Switches that Can Help You". General Electric Co.

LIGHTING

22 Catalog No. F-41 illustrates and describes fluorescent lighting fixtures for industrial, commercial and residential use. The Frankelite Co.

[Continued on page 80]

Life's Happiest Hour : : : : BY WEBSTER


THANKS FOR THE ORDER, NOW YOU'RE ALL SET TO DO SOME REAL FAN BUSINESS THIS SUMMER
G-E FAN PORTFOLIO
A DISTRIBUTOR SALESMAN GIVES A FAN DEALER A POWERFUL BOOST TOWARDS HOT WEATHER PROFITS
WEBSTER

Sell the Fans with the Popular Name—G-E—and Benefit from This Strong Promotion

Here's the big fan news for 1941! A new group of G-E Fans to sell at lower prices!

G-E Fans are 'way up there in sales every year. Because they're known through advertising. Because they're pushed by powerful promotion. Because the public accepts them as tops. Because they're the most complete line of fans in America.

Now, with this new low-price group, G-E Fans will move faster than ever—bring you more profit than ever! Get the cheerful story from your G-E distributor salesman. Hitch up with the leader and go to town with G-E fans this summer!

Fan Sales Section, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut

YOU GET ALL THIS POWERFUL PROMOTION *FREE!*

1. A 10-color action *Window Display* that will stop 'em, hold 'em and sell 'em.
2. Handsome *Catalogs* crammed with facts and illustrations that build sales.
3. Direct *Mail Pieces* that "get in the door" of homes, stores, offices.
4. Local newspaper *Ad Mats* that help you sell when your market is "hot."
5. Powerful National *Newspaper Ads* in over 175 key cities—run when you need them—in local hot weather.

GENERAL ELECTRIC

KLEIN . . .
STANDARD WITH ELECTRICIANS

"Since 1857"

NO "pretty good" plier is good enough for the man who has to work with them every day. That's why electricians—everywhere—rely on Klein Pliers. They know that each pair must pass an individual test far in excess to any service in the field. They know, too, that every pair is individually fitted, tempered and adjusted—that Klein Pliers have been the standard—"since 1857."

Your copy of the Klein Pocket Tool Guide will be sent on request.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor:

International Standard Electric Corp., New York

Mathias **KLEIN** & Sons

3200 Belmont Avenue, Chicago, Illinois

BURNISHER

23 A folder illustrating and describing a new burnisher for rings and commutators. Ohio Carbon Company.

LIGHTING FIXTURES

24 A 100-page catalog featuring fixtures for residential and commercial use. It is profusely illustrated. Lightolier Company.

CAPACITORS

25 A 20-page booklet giving data for capacitor application on industrial plant circuits. It tells how, where and how much capacity to apply to circuits for power factor improvement. Westinghouse Electric & Mfg. Co.

FLUORESCENT LIGHTING

26 This catalog covers the complete line of fluorescent fixtures and gives technical data and suggestions for lighting problems. Edwin F. Guth Co.

MOTOR STARTER

27 Folder GEA-2964B gives descriptive data, illustrations and dimensions of the new full-voltage magnetic motor starters designed for machines. General Electric Co.

LAMP STARTER

28 A 4-page folder announcing the new fluorescent lamp starter known as "Mirastat". Hygrade Sylvania Corp.

WELDER

29 Descriptive data 26-320 describes the construction and operational features of the "Midget Marvel Flexarc" a.c. welder. Westinghouse Electric & Mfg. Co.

OUTLET BOXES AND COVERS

30 A four-page folder illustrating and describing porcelain outlet boxes and covers for use in factories, homes, offices and farm buildings. Illinois Electric Porcelain Co.

FLUORESCENT UNITS

31 Catalog No. FL-3 and price list includes the full line of wired and unwired fluorescent units and Line-O-Lamps. The Wiremold Co.

SWITCHES

32 A folder featuring various types of automatic time switches, together with a selector chart. Reliance Automatic Lighting Co.

FLUORESCENT LIGHTING

33 Bulletin No. 20 illustrates and describes fluorescent daylight lighting fixtures for industrial and commercial use. Multi Electrical Mfg. Co.

CALCULATOR

34 This calculator gives information on new wire sizes and capacities, based on the 1940 National Electrical Code. Also gives data for wiring motor circuits. Bull Dog Electric Products Co.

CAPACITORS

35 Catalog No. 185A consists of 20 pages of data on mica, paper, dykanol, wet and dry electrolytic capacitors. Cornell Dubilier Electric Corp.

MOTORS

36 Folder GEA-9788 outlines high-speed induction motors for direct connection. Folder GEA-3488 tells how to maintain d.c. motors. General Electric Co.

BLACK LIGHT

37 A 4-page folder showing some applications of fluorescent colors activated by so-called "black light". Continental Lithograph Corp.

FITTINGS AND CONNECTORS

38 Bulletin 105 consists of 28 pages of illustrations and descriptive data on conduit fittings and solderless connectors. O. Z. Electrical Mfg. Co., Inc.

Circle numbers, sign and paste on a penny postcard or mail in an envelope.

ELECTRICAL CONTRACTING **February**
330 West 42d St.
New York, N. Y. **(Not good after April 1)**

Please send me without obligation, manufacturers' literature herein described and identified by numbers circled below.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38

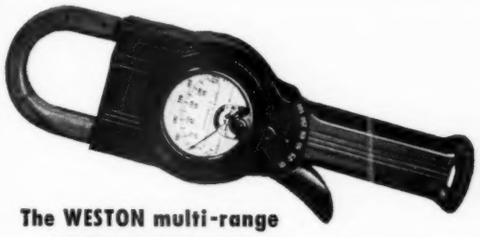
NAME .....**TITLE**.....

COMPANY .....

ADDRESS .....

CITY .....**STATE**.....

THE EASY WAY ... to Sustain EXACTING PRODUCTION SCHEDULES!

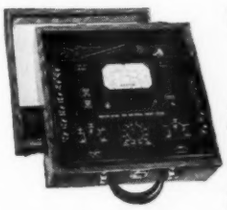


The WESTON multi-range AC Clamp-Ammeter

Available in three models . . . each having six individual full scale ranges . . . to suit all maintenance applications. Has convenient 6 position range changing switch. Well insulated for protection. Can be used with insulated or non-insulated conductors up to 2" diameter.

WESTON Model 703 Sightmeter

Available equipped with the stable, all-glass WESTON perfected VISCOR filter . . . for measuring fluorescent, incandescent, neon, and all other light sources direct, without correction factors.



WESTON Model 785 Industrial Circuit Tester

A compact, self-contained unit which provides all the ranges (27 in all) necessary for voltage, current and resistance measurements wherever high sensitivity is a factor . . . including signal systems, telephone circuits, sensitive relay circuits, photo-cell circuits, PA systems and amplifiers, etc., etc.

No longer is it necessary to interrupt a circuit and stop production while motors and machines are being tested. With the WESTON AC Clamp-Ammeter you do your testing with all machinery "on the line". The jaws of this compact maintenance tool are just hooked around the conductor or switch-blade, and you get your current reading. So simple, each test takes but a fraction of the time ordinarily required. Thus you save testing time and save working time, while safeguarding against equipment break-downs and costly power losses. *It's an essential tool for any shop faced with an exacting production schedule.*

And for the assembly line, the inspection department, or for other test requirements, there are WESTON instruments specifically designed to do the job quicker, simpler, and with true WESTON dependability. Make sure you are getting all the benefits of modern WESTON instrumentation. Weston Electrical Instrument Corp., 672 Frelinghuysen Avenue, Newark, New Jersey.

Laboratory Standards . . . Precision DC and AC Portables . . . Instrument Transformers . . . Sensitive Relays . . . DC, AC, and Thermo Switchboard and Panel Instruments.

WESTON

Specialized Test Equipment . . . Light Measurement and Control Devices . . . Exposure Meters . . . Aircraft Instruments . . . Electric Tachometers . . . Dial Thermometers.

FOR OVER 52 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS

In the News

ALMOST HALF CENTURY of continuous activity in the electrical contracting business, is the record of J. F. Buchanan, president, J. F. Buchanan Electric Co., Philadelphia, Pa. Since its organization in 1892, his firm has done some of the largest industrial and commercial electrical construction work in the city.

NECA LABOR RELATIONS COMMITTEE

Election by mail ballot of the members of the IBEW Employers Section of NECA conducted during November and December 1940, resulted in changes of representatives from two Divisions. D. B. Clayton, of Birmingham, Ala., was elected to represent Division 5, and G. L. Gamp, of St. Louis, Mo., was elected to represent Division 7.

The following men will constitute the Labor Relations Committee for the coming year:

Div. 1—H. T. Cole, Boston, Mass.
Div. 2—A. L. Bush, New York, N. Y.
Div. 3—A. H. Wilson, Washington, D. C.
Div. 4—E. C. Carlson, Youngstown, Ohio.
Div. 5—D. B. Clayton, Birmingham, Ala.
Div. 6—J. N. Pierce, Chicago, Ill.
Div. 7—G. L. Gamp, St. Louis, Mo.
Div. 8—Eugene Ashe, Houston, Texas.
Div. 9—C. L. Chamblin, San Francisco, Cal.
Div. 10—S. G. Hepler, Seattle, Wash.
Div. 11—Geo. W. Patterson, Toronto, Ont.

N. J. CONTRACTORS WANT STATE LICENSE

The electrical contractors of the state of New Jersey may soon have a state licensing law, that is, if the contractor members of the New Jersey Council of Electrical Leagues have their way. The spark of this activity, which has been in peaceful hibernation for the past five years, was kindled at the League convention in Atlantic City in October when a resolution was passed to appoint a committee to "seek the best means to protect the general public and properly license all individuals and companies conducting an electrical contracting enterprise in the state of New Jersey."

The campaign was fanned into a sizable flame at Trenton on January 17 when the committee in charge of securing the law held an open meeting for the contractors of the state, to sound them out. Forty-five contractor members of the Council from all parts of the state expressed enthusiastic approval of the move and promised active support.

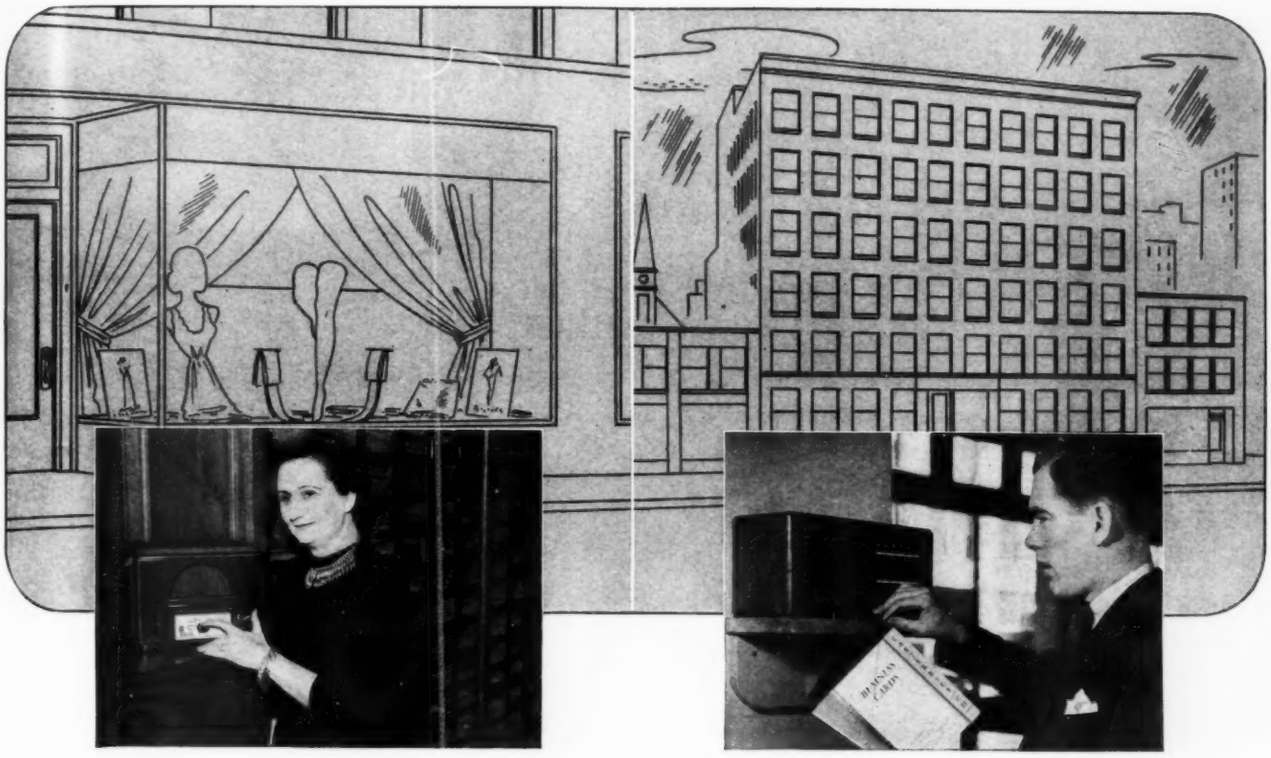
The general plan of the committee is to set up a licensing commission approved by the governor of the state and consisting of one contractor member, one representative of labor and possibly one or two other members with an executive secretary. The proposed legislation now will cover "only those regularly operating as electrical contractors in the state."

With the assurance of full support, W. A. Shaw, chairman of the committee now plans a series of committee meetings to formulate the draft of the bill and the plans for securing its adoption. His committee consists of two contractor representatives from each of the eight participating leagues in the Council.

NISA CENTRAL DISTRICT CHAPTER NAMES OFFICERS

Last year's slate remained intact for the 1941 season as the officers of the Central District Chapter of the National Industrial Service Association were announced on January 14. Joe Ferrair, Excel Electric Service Co. begins his second term as president. Ed James, of Northwestern Electric Co.; Burton R. Hohman, Hohman

"I don't worry none about Paw reading them dirty magazines since I got that sterilamp."



Here are Actual Teletalk Sales that Made Contractors a 3-Way Profit

There are literally thousands of installations like those shown above, upon which you, too, can make a substantial three-way profit.

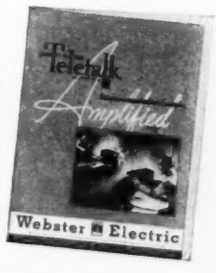
Those prospects are right in your street, in your neighborhood, in your city. They are the small stores like your own; business and professional offices, schools, manufacturing plants—everywhere that time is a factor or where people want to do less walking.

Teletalk amplified communication is here in a big way—and hundreds of contractors are now and will continue making money on the sale of complete systems; on the material and the labor involved in the installation. This all represents good profit on moderate effort and small investment.

Models range from low priced five station units up to this deluxe model 524 which has an inbuilt microphone and requires no manual operation.

Send for this catalog!

It shows you the entire Teletalk line, explains its features and operation and the wide scope of its application. Send for it.



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MANUFACTURERS OF TELETALK INTERCOMMUNICATION AND PAGING SYSTEMS • POWER AMPLIFIERS AND SOUND DISTRIBUTION EQUIPMENT • RADIO PHONOGRAPH PICKUPS • IGNITION TRANSFORMERS AND FUEL UNITS FOR OIL BURNERS

In Line with Today's Needs G.E. Offers

Quality Wiring Devices

FOR INDUSTRY

LOOK AT THESE EXAMPLES

FOR LIGHTING

GE3330 Weatherproof socket—for outdoor or semi-exposed locations

GE2703 Textolite socket—strong where strain comes

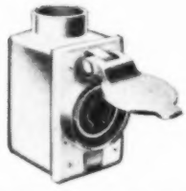
GE3043 S.P. 30-amp. locking switch — for heavy duty applications

GE2842 S.P. 10-amp. switch, "T" rated, enclosed box—for high grade work

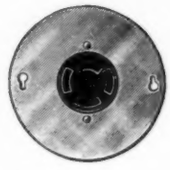
FOR POWER

GE3305 Polarized 20-amp. outlet—takes two 20-amp. caps

49X656 30-amp. outlet on 4-in. box cover —for heavy-duty polarized circuits



GE3399 with GE3401 3-wire 50-amp. Twist-Lock receptacle—positive power connection



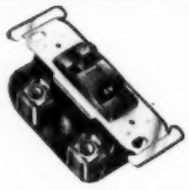
GE3150 20-amp. Twist-Lock outlet—a twist of the cap prevents loosening

FOR PROTECTION

GN115 Textolite plug fuse

GE3179 Silvend fuse—cuts down overheating from oxidation

34971 Fuse block—slate base



GB115 Branch-circuit circuit breaker — for protection and control of branch circuits

Whether you are wiring a new plant or modernizing the wiring in an old one you will find the wiring devices you need in the G-E line. G-E wiring devices are made of quality materials according to rigid specifications. They can be installed easily and will give lasting service no matter how heavy production schedules become.

For further information see the nearest G-E Merchandise Distributor or write to Section D-182, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

In the News

[FROM PAGE 82]

and Hill and James J. Smat, Queen City Electric Co. retained their posts as vice-president, secretary and treasurer respectively.

The board of directors for 1941 includes Arthur Wagner, Sr., Arthur Wagner Electric Co.; Charles Kaska, Chicago Electric Co.; Roy Hyre, Hyre Electric Co.; C. A. Sievert, Sievert Electric Co.; P. H. Guion, Scott-Pillar Electric Co. and E. J. Ther, Ther Electric and Machinery Co.

REPAIR SPECIALIST E. C. Goodwin (left), Goodwin-Pray, Inc., and M. D. Goodman, Goodman Electric Machinery Co., both of Newark, N. J., combine their talents to make their organizations one of the best repair shops in the city. Mr. Goodwin is the motor specialist and handles shop details, while Mr. Goodman is the electro-magnet specialist and handles sales.

BOSTON CONTRACTORS MEET

The Electrical Contractors Association of Greater Boston, Inc., held their annual meeting for the election of officers in the Statler Hotel on January 9. The following members were elected to office for this year: Albert Frank, Eastern Electric Co., president; Alfred W. Kenworthy, Kenworthy and Taylor, vice-president; Philip W. Gaston, Gaston Electric Co.; secretary, Gilbert L. Chadwick, Lord Electric Co.

Members of the Board of Directors include Frederick P. Coffey, Anderson and Coffey, Inc.; Theodore Labin, Federal Electric Co. and C. B. Macfarlane, Macfarlane & Sons, Inc.

GEORGIA A-W COVERS LARGE AREA

The Georgia Adequate Wiring Bureau is now ready to officially certify approved residential wiring installations throughout the territory of the Georgia Power Com-

When the boss says, *"Put 'er there!"*

ALZAK *aluminum* REFLECTORS

You can dentify a genuine Alzak Reflector by a label affixed to it by the manufacturer. This lists the patents protecting the processes that assure uniform, high quality workmanship. Look for that label when you are buying reflectors.

"Light, lots of it, right there." The lighting engineer chooses Alzak Aluminum reflectors for the job because they direct light more efficiently than any other reflecting surface. And Aluminum is shaped exactly as desired; no cobbling the design to suit limitations of a material.

Alzak Aluminum reflectors take a long time to "grow old." You'll find that, year after year, they retain their youthful reflectivity to a degree that invites comparison. They're no trouble to keep clean; simply wash with soap and water. There's no chipping, because the smooth oxide coating, glass-like hard, is an integral part of the metal.

Where diffuse reflecting surfaces, or a combination of diffuse and specular, are required, you can get them too. Some Alzak Aluminum reflectors are intended for indoor use. Others are able to withstand out-of-door exposure and many other corrosive conditions. Whatever your use, be sure and specify the right Alzak finish for each job.

ALCOA

DEFENSE COMES FIRST

To meet the needs of the National Defense Program, plus the normal demands of peace, a vast expansion of our already greatly increased production capacity is being speeded. When the emergency is past, there will be more Aluminum available than ever before.

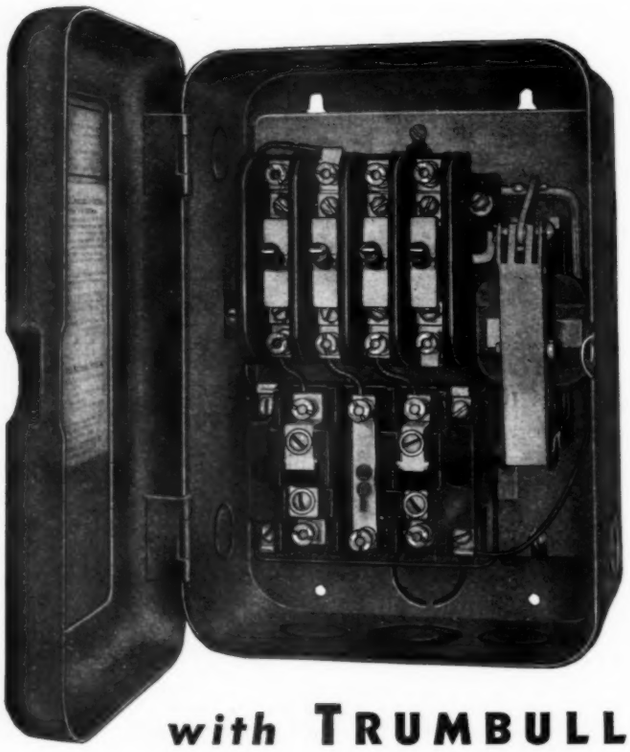
Meanwhile, if you can't get all the Aluminum you want when you want it, remember Aluminum is helping you by helping to meet the National emergency.

ALUMINUM COMPANY OF AMERICA
1946 GULF BUILDING • PITTSBURGH, PA.

TRUMBULL

PUSH BUTTON

Symbol of ACTION



with TRUMBULL

MAGNETIC STARTERS

. . . action controls for modern action machines . . . Now is the time to check motor controls not only for motion-saving convenience that speeds machine operation, but for cost and time-saving protection to machines under heavy production loads . . . and for the modern Trumbull features such as vertical, dust free contacts, removable unit interiors, interchangeable relay heaters, and all parts removable from front, that assure faultless 24-hour-a-day operation.

A broad range of sizes and capacities in Starters, Contactors, Combinations and Reversing Controllers. Get Trumbullaid Bulletin 404.

ESTABLISHED 1899

THE TRUMBULL ELEC. MFG. CO.

PLAINVILLE CONN. U.S.A.

A GENERAL ELECTRIC ORGANIZATION

KEEP *Alert* ELECTRICALLY use your TRUMBULLAIDS

NEW YORK - PHILADELPHIA - BOSTON - CHICAGO - DETROIT - LUDLOW, KY. - ATLANTA - NASHVILLE - LOS ANGELES - SAN FRANCISCO - SEATTLE

In the News

[FROM PAGE 84]

pany, which embraces 45,000 square miles of the state and 187,000 residential customers.

The Bureau, sponsored by the Atlanta Electrical Association, has set a mark of 500 new homes certified during 1941. In conjunction with the certification activity, the power company will offer a complete layout service free to builders, architects, contractors and home owners. In addition, a speakers' bureau will provide interested civic groups with information concerning the program. Robert Wardle, Jr., of the power company, is in direct charge of the certification program.

LOS ANGELES CONTRACTORS OPTMISTIC

A note of decided optimism was apparent among the members present at the annual meeting of the Los Angeles Chapter, NECA, held on January 6. Along these lines, the activities of the Chapter for the coming year will center around an aggressive campaign to produce and develop business for the electrical contractor—with special attention given to apprentice training, sales promotion, industry and labor relations and legislation.

Newly elected president, A. L. Stone, Stone Electric Supply Co., struck this keynote in his acceptance speech when he said, "We are entering a sellers market . . . our association must be in a position to assist industry and business in securing the services of qualified electrical contractors . . . be prepared to meet the demands expeditiously and efficiently . . . we have a very definite responsibility in maintaining continuous operation of all types of enterprise."

Other officers elected were: L. L. Goddard, Pacific Electrical & Mechanical Co., vice-president; W. B. Walker, H. H. Walker, Inc., treasurer. The Executive Committee includes these three officers and G. E. Arbogast, Newbery Electric Corp.; J. O. Case, Quality Electric Co.; George DeAth, Peerless Electric Construction Co.; Herbert L. Evans, Nicholas Electric Co.; R. Max Fry, R. M. Fry Electric Co.; Sidney F. Hill, Hill Electric Company. J. J. Newitt was reappointed Executive Secretary.

ELECTRICAL AND GAS ASSOCIATION OFFICERS

John H. McKenna, Knapp-Monarch Co., was elected president of the Electrical and Gas Association of New York, at the annual meeting of the organization on January 15. Mr. McKenna, who is a widely known executive in electric and gas appliance sales and merchandising circles, succeeds David S. Youngholm of Westinghouse Electric & Mfg. Company.

What B.R.* Users say:

COAL COMPANY . . .
"We make continual use of it in connection with our mining apparatus and supplies purchases."

TYPEWRITER MANUFACTURER...
"This book is used to locate sources of supply on our electrical equipment and machinery, and our electrician feels that he would be lost without it."

INDUSTRIAL CONTRACTOR . . .
"Our best indication of the use to which we put this book is the fact that last year's volume is almost completely worn out through continuous use."

ELECTRICAL CONTRACTOR . . .
"I do not believe a week has gone by that we do not use it five or six times."

POWER AND LIGHT COMPANY..
"Within five minutes after receipt we had used it for reference regarding the availability of truck mounted ladders."

Check them off—active electrical men . . . contractors . . . men in every type of plant . . . in utilities, coal companies . . . they all find the Electrical Buyers Reference *valuable* because they *use* it . . . in a dozen different ways, maybe, but always to find that particular bit of buying information . . . and to find it *quickly, efficiently.*

USE your copy of BR* today, and like the men quoted above, find out how valuable this reference volume can be in *your* business.

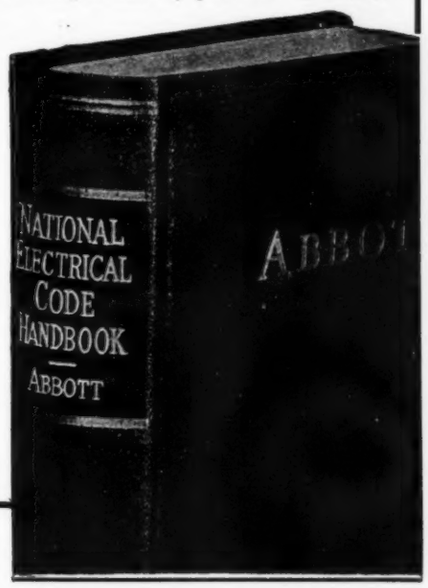
***ELECTRICAL BUYERS REFERENCE**
330 West 42nd Street, New York City

How to handle all kinds of wiring and installation jobs

in strict accordance with

THE 1940 NATIONAL ELECTRICAL CODE

Here is the electrical contractor's job book almost completely rewritten in accordance with the new 1940 Code requirements, planned to enable electricians to understand new rulings of the National Electrical Code and to do work in accordance with the Code.



Just off the press!

THE NEW

NATIONAL ELECTRICAL CODE HANDBOOK

covering the new 1940 Code

FIFTH EDITION FULLY REVISED

By Arthur L. Abbott

585 pages 5 x 7½, illustrated, $3.00

Simplifies the Code for quick, easy application

It restates rules in simple language, plus explanations, practical directions, and diagrams, showing what the rules mean and how to apply them. *It groups rules in special arrangements, making it easy to find ALL rules applying to any given job.*

A time and money saver

All in all the Handbook is one of the most unusual and helpful electrical books that has been published in recent years. It gives a wealth of information from the practical angle of getting jobs done according to legal requirements. It saves delay in starting jobs, it saves time and money in avoiding false starts, errors and violations. At the same time it contains so much clearly presented information that it will pay to use it for general reference on many questions of materials, plans, wiring and installation.

Some of the features

- Contains a handy reference table that shows at a glance just what lighting and appliance loads may be connected to each of the five types of branch circuits described in Art. 210.
- Concisely explains complicated new rules in the Code under which 17 difficult types of insulated conductors are recognized.
- Clarifies provisions relating to carrying capacities, rubber - insulated wires, small-diameter wires for re-winding insulations for extra high temperatures, etc.
- Presents the motor wiring and protecting tables, always an important feature of the Handbook, in a new form which makes easy the solution of problems which arise when determining the rating or setting the fuses or circuit breakers protecting motor branch circuits.

IMPORTANT NOTE
The new 1940 Code contains more changes than any previous Code, and the new ABBOTT covers fully every item of this new Code.

10 DAYS' FREE EXAMINATION

Mail this coupon today

McGRAW-HILL BOOK CO., Inc.
330 West 42nd Street, New York

Send me Abbott's National Electrical Code Handbook for 10 days' examination on approval. In 10 days I will send $3.00 plus few cents postage, or return book postpaid.

(WE PAY POSTAGE IF REMITTANCE ACCOMPANIES ORDER.)

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The MOST COMPLETE LINE OF
Service Connectors

LARGEST VARIETY of types, and a COMPLETE range of sizes. For all kinds of conductors.

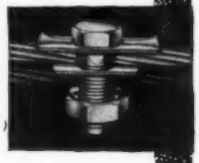
Popular connector at left is carried in stock in ALL sizes, up to 1,000,000 CM. Furnished with or without retainer.

ANY MATERIAL — Hardware Bronze, Silicon Bronze, Aluminum.

MILLIONS IN USE and never one rejection due to performance or workmanship. Can be re-used over and over.

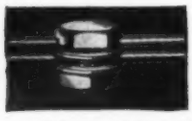
MADE IN OUR OWN PLANT under engineering supervision. Bodies and nuts precision machine-threaded for perfect fit. No sharp edges.

ALUMINUM Connectors machined from hard drawn rod, with forged spacers.



SERVICE POST Connectors for one or more conductors; many types.

SERVICE ENTRANCE Connectors with extruded copper bodies, Everdur screws.



TELEPHONE Service Connectors, brass rod—plain, nickel plated or tinned.

AND THOUSANDS MORE. Every connector Dependable. Preferred by leading utilities and "industrials," and manufacturers of electrical equipment.
Write for Catalog.

PENN-UNION ELECTRIC CORPORATION
ERIE, PA. *Sold by Leading Jobbers*

PENN-UNION
Conductor Fittings

In the News

[FROM PAGE 86]

Other officers elected were: first vice-president, James W. Carpenter, Long Island Lighting Co.; second vice-president, S. J. O'Brien, S. J. O'Brien Sales Corp.; third vice-president, T. F. Barton, General Electric Co.; fourth vice-president, Leslie C. Boyd, Van Cortlandt Appliance Corp.; treasurer, H. C. Calahan, General Electric Supply Corp.; secretary, Norman L. Myers, Westinghouse Electric & Mfg. Co.; assistant secretary, James A. Sackett, Kings County Lighting Company.

COMING MEETINGS

New York Electrical Trade Show—Second Annual, Hotel New Yorker, New York City, February 5–8.

Wisconsin Electrical Contractors Association—Annual Meeting, Hotel Schroeder, Milwaukee, Wis., February 14 to 15.

National Electrical Manufacturers Association—Mid-Winter Conference, Palmer House, Chicago, Ill., February 17-21.

Minnesota Electrical Council, Minnesota Electrical Association, North Central Associated Electrical Industries—Winter Convention, Hotel Albert, Albert Lea, Minn., February 20–22.

National Electrical Manufacturers Association—Spring Conference, The Homestead, Hot Springs, Va., May 11–15.

National Electrical Wholesalers Association—The Homestead, Hot Springs, Va., May 18–22.

New York State Association of Electrical Contractors & Dealers—Saranac Inn, Saranac N. Y., July 7–10.

National Electrical Contractors Association—Annual Convention, Rice Hotel, Houston, Texas, Oct. 6–8.

National Electrical Manufacturers Association—Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y., Oct. 27-31.

DESPARD ON A-W COMMITTEE

Victor R. Despard, vice-president of Pass & Seymour, Inc., was recently appointed a member of the Executive Committee of the National Adequate Wiring Bureau. In commenting on this appointment, Mr. Despard said—

"The growth of our industry has been seriously retarded because the adequacy of wiring has not kept pace with the increased use of electrical service it is called upon to deliver. I believe we have been too timid in setting up minimum specifications. We have a stronger claim for more of the house-dollar than most things the public buys. Even one fine piece of furniture costs more than a good complete wiring job with all the comforts and conveniences electricity offers 24 hours a day.

Mr. Despard brings his wide experience in most branches of the electrical industry to the support of the adequate wiring program.

Peerless MOTORS

USE Peerless Motors on replacement jobs. They are built to stand the gaff—to give long, trouble-free service—to stand up under that extra load which a motor must deliver at times. Use them, too, on all initial installations. They do much to build up customer good will—to contribute towards your reputation as a shop that does dependable work which stands up in service. Write for literature, prices and discounts.

Quick Deliveries

PEERLESS EXHAUST FANS
Help Speed-Up Production

TODAY'S need in industry for maximum production demands adequate ventilation to keep workmen fresh, keen and alert. Investigate the effectiveness and dependability of Peerless Exhaust Fans for this purpose. You can make money with them. Write for the Peerless Exhaust Fan Bulletin.

THE Peerless ELECTRIC CO.
WARREN, OHIO

PIERCE ELECTED TREASURER OF CHICAGO ELECTRIC ASSOCIATION

J. Norman Pierce, Pierce Electric Co. was elected treasurer of the Electric Association of Chicago for the 1941 season. Other electrical contractors named to official posts in the organization were F. S. Berry, Berry & Company and Wm. McGuineas, United Electric Construction Company, elected to serve as directors for a two year term. Also serving on the Board for 1941 are Charles Osburg, Riverside Electric Company and J. N. Pierce, Pierce Electric Co.

G. A. Freeman, vice president in charge of sales of the Commonwealth Edison Company was elected president of the Association.

WITH THE *Manufacturers*

G-E Personnel Changes

General Electric Company announces the appointment of T. F. Barton as district manager of the New York district. For the past two years Mr. Barton was assistant district manager.

J. J. Curtin, who for the past 11 years has been in charge of sales promotion and publicity work in the motor division of the Industrial Department, has been transferred to the wire and cable division of the Central Station Department at Fort Wayne, Ind. He replaces B. F. Illsley, who moved to Schenectady to be general assistant to W. V. O'Brien, division manager of wire and cable. O. F. Vea has taken over the work formerly handled by Mr. Curtin.

P. A. McTerney has been appointed manager of sales, large motor and generator division of the Industrial Department.

An apparatus agency sales section has been added to the Industrial Department and it is under the supervision of G. L. Irvine, who has been appointed manager of apparatus agency sales.

G. E. Cassidy has been appointed engineer of the general applications section, a new division of the Industrial Engineering Department.

J. E. Overstreet has been placed in charge of wire and cable sales.

WESCO Changes

J. C. Schmidtbauer northwestern district manager of the Westinghouse Electric Supply Company at Chicago, has been elected a vice-president of the company. Mr. Schmidtbauer will continue to have headquarters at the northwestern district office.

J. H. Fisher has been appointed man-

"WEDGE-ON" WIRE SPLICERS

Unites ends of solid or stranded wires as one. Particularly adapted to line, junction box and service entrance splices. For wire sizes from No. 16 through 4, and for combinations within that range.

1. T. & B. Pressure (solderless) Connectors

2. "via GraybaR"

Here's a newer, modernized line of connectors that perks up your profits in these ways:

- install fast and stay fast
- eliminate solder and time-wasting tinkering
- assure permanent electrical connections
- provide a specific type for every wiring need or system: wire, cable, rod, tubing and bar.

Get a line on this modern line of connectors now "via GRAYBAR"—write for complete information on your particular needs, or we'll be glad to send you a catalog covering this line at your request.

"WEDGE-ON" LUGS Great pressure holds wire securely. Barrel supports insulation so that neither flexing nor vibration can break strands. Available with or without insulating skirt for wire sizes No. 4 to No. 22, solid and stranded.

"WEDGE-ON" TEE TAP

A small tee tap, especially adapted for all types of meter installations. Main is locked, branch is cold formed to make a positive tamper proof connection, easily taped.

"HINJON" JUNIOR TAP

Four sizes tap all mains No. 4 to 500 MCM to small wire branches No. 14 to No. 4. One piece construction, full salvage value.

"LOCK-TITE" TEE-PARALLEL TAP

Six fittings will tap, tee or parallel, all combinations 1/0 to 500,000 CM on the main to No. 2 to 500,000 CM on the branch. One piece construction.

"LOCK-TITE" LUG

Seven over-lapping sizes fit all cables, No. 4 through 1,000,000 CM Vibration proof, no loose parts, once made up tight it stays tight.

GRAYBAR ELECTRIC COMPANY

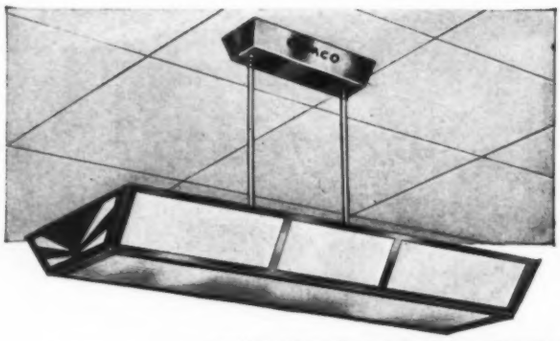
Executive Offices: Graybar Bldg., N.Y.C.

Branches In Over 80 Principal Cities

Defense Note

GRAYBAR offers action-service in emergencies on all types of electrical equipment and supplies.

GraybaR QUALITY Since 1869 *Everything Electrical* GraybaR ELECTRIC COMPANY



These fixtures are made for four 40 watt or four 20 watt T-12 fluorescent lamps.

Finish: Satin silver bronze outside, inside and louvre are white enamel. The canopy and stems are satin cadmium.

Efficient FLUORESCENT *Lighting*

for OFFICES, SHOW ROOMS and STORES

Our complete line of fluorescent fixtures for commercial and industrial uses are fully described and illustrated in the Oamco Fluorescent lamp fixture catalog. No. 98.

THE OAMCO four light commercial fixture is designed to give the highest efficiency in diffused illumination. This unit will give a soft light on the working plane, and an even distribution on ceiling and side walls. Fixtures are equipped with high power factor (95–100%) tulamp ballasts, with starting compensators for each ballast, also lamp holders and removable starter switches.

Fixtures may be obtained with a frosted ribbed glass bottom or with a louvre bottom which has a 45 degree cut-off angle. They can be supplied for surface mounting or suspension.

Overbagh & Ayres Mfg. Co.

411 SO. CLINTON STREET . . . CHICAGO, ILL.

EVERY BATHROOM NEEDS THIS *Extra HEAT*

You need this bathroom heat every day in the year. When it's too warm for unit heat or too cold for unit heat alone—Thermador Built-In Bathroom Heaters are the answer. Just a flip of the switch and you are instantly blanketed in flameless, fumeless electric warmth.

THERMADOR ELECTRIC BATHROOM HEATERS

THERMADOR ELECTRICAL MFG. CO.
5119 So. Riverside Dr., Dept. EC 2
Los Angeles, California

Gentlemen:
Please send me complete contractors specifications and prices.

Name_____
Street_____
City_____ State_____

ACME AIR COOLED TRANSFORMERS

Air-cooled transformers are being used more and more in all kinds of manufacturing plants, principally because their installation affords definite economies which quickly pay their cost. Savings in power and light charges and elimination of complete light-wiring systems are factors that have caused economy-wise plant managers to specify their use. And most maintenance men prefer them—for once installed they require no attention.

A SIZE FOR EVERY APPLICATION

Acme tansformers are designed in sizes from 100 watt to 25 KVA. auto and insulated types. Attractive in appearance and outstanding in efficiency. No better transformer ever built.

THE ACME ELECTRIC & MFG. CO.
36 WATER STREET • CUBA, NEW YORK

Acme ACME Electric
TRANSFORMERS

In the News

[FROM PAGE 89]

ager of the northwest district with headquarters in Chicago. He will take over the duties of Mr. Schmidtbauer.

H. M. Gansman, a vice-president of WESCO in New York City, will transfer his headquarters to Philadelphia and will take over management of the middle Atlantic district.

A new sales district has been formed to be known as the northern district, with headquarters in Milwaukee. Henry Czech, now head of the northern group branches of the company, was appointed manager of the new district. The northern district will include branches in Milwaukee, Madison, St. Paul, Minneapolis and Duluth.

Bunting Brass Changes

The Bunting Brass & Bronze Company of Toledo has transferred William T. Streicher, sales engineer, from the Kansas City office to the Chicago area.

John J. Mengler has joined the company and will sell in the Kansas City field.

Robert J. Bergum has rejoined the company and will represent the line in Minneapolis.

William Dorsey will sell in Seattle, Wash.

James F. Roberts, sales engineer, has been transferred from Dallas, Tex. to the middle west with headquarters in Indianapolis. William A. Schneider will replace Mr. Roberts in the Dallas area.

Graybar Electric Company has opened a new branch office at 112 Eleventh Street, Des Moines, Iowa. J. P. Lawton has been appointed manager of this office and will have as his assistant, L. E. Williamson, service supervisor.

H. O. Edoff has been made sales manager of the branch office at 453 Worthington Street, Springfield, Mass.

The Thomas & Betts Company, Elizabeth, N. J. announced the election of George C. Thomas as president and treasurer of the company. Nester J. MacDonald was elected vice-president in charge of sales. Mr. Thomas formerly was vice-president, general manager and treasurer and Mr. MacDonald, general sales manager of the company.

Steel and Tubes announces the appointment of C. D. Belt and Company, Denver, Colo., as sales agents for the Electrical Division, covering the states of Colorado Wyoming and Montana.

Westinghouse Electric & Manufacturing Co., has appointed G. W. Honsberger as manager of the Louisville, Ky., office.

The manufacturing activities of the **Revere Electric Company,** Chicago, have been taken over by the Revere Electric Manufacturing Co., 2949 N. Paulina St., Chicago. The supply business will be known as Revere Electric Supply Company, 757 West Jackson Blvd., Chicago. The personnel of both companies remains the same, Van N. Marker as president and Fred R. Eiseman as secretary and treasurer.

Fullman Manufacturing Co., Latrobe, Pa. announces the appointment of two new representatives. H. C. Johnson, 519 Case Building, Rochester, N. Y. will cover upstate New York, exclusive of the Metropolitan area.

Zinsmeyer Co., with headquarters at 717 Mateo St., Los Angeles and 59 Columbia Square, San Francisco, will handle the state of California.

Skilsaw, Inc., Chicago, has named Leonard S. Parker as vice-president in charge of operations. Mr. Parker has been superintendent of production for a number of years.

Mitchell Manufacturing Co. of Chicago, has appointed Edwin A. Nickel as advertising and sales promotion manager. Mr. Nickel has been in sales promotional work for eighteen years, having served with Hygrade Sylvania, Dictograph Product Co., Lennen & Mitchell and Chas. W. Hoyt Co.

Chelsea Fan & Blower Co., Inc., formerly of New York City, has moved into a new plant at Olsen & Grove Street, Irvington, N. J.

Schwarze Company of Adrian, Mich. has appointed Albert A. Schuhler as sales manager of the Stanley & Patterson Division.

Despatch Oven Company, Minneapolis, Minn., has appointed Gerald B. Duff as sales engineer in the Newark-New York territory. Mr. Duff's office is at 68 Clinton Avenue, Newark, N. J.

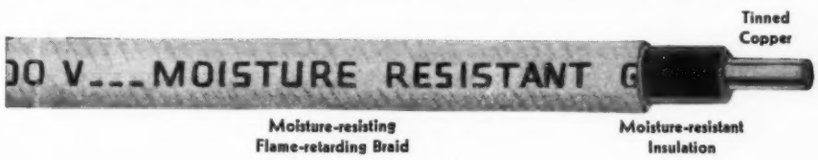
Standard Electrical Products Co., formerly of St. Paul, Minn., has moved to its new and larger factory and offices at 417 First Avenue, N., Minneapolis.

FOR MOIST LOCATIONS

G-E TYPE RW BUILDING WIRE

Is Approved for Use

In Lieu of Lead-covered Wire



By using G-E Type RW Moisture-resistant Grade Building Wire in place of lead-covered wire, you can save yourself time and money. It is easy to handle and can be installed quickly.

This wire is approved by the Underwriters' as listed in the 1940 N. E. C. for use in lieu of leaded cable in raceways where moisture is a problem.

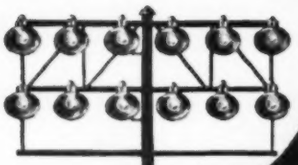
1. Underground
2. In concrete slabs or masonry in direct contact with the earth
3. In permanently moist locations
4. Where the accumulation and condensation of moisture within the raceway is likely to occur.

With this wire, more conductors may be used in one conduit or duct; or smaller conduits or ducts may be used. Wire pulling is easier and stripping, splicing, etc. can be speeded up. G-E Type RW Building Wire is similar to other G-E Braided Building Wires except that its insulation is made of a special low moisture absorption rate rubber compound.

For further information see the nearest G-E Merchandise Distributor or write to Section W-182, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

PROTECTIVE LIGHTING *STAYS PUT ON* MONOTUBE *POLES*



● Protective lighting is up "for the duration" and then some, when mounted on Monotubes. These tapered poles are made of quality cold rolled steel and designed by experts to meet the height and strength requirements for efficient, low-cost service.

Monotube Steel Poles are available in standard lengths from 12 to 90 ft. for mounting 1 to 24 floodlights. Write for Catalog No. 70A describing the complete Monotube line.

THE UNION METAL MANUFACTURING CO.
CANTON, OHIO

More Gossip

Sound Policy

Every 10 years, says Frank Boyd, president of Pacific Electric Motor Co., electrical contractor of Oakland, Calif., it is good policy to modernize. Therefore, Pacific Electric Motor Co., which has one of the most modern contracting establishments in the Bay area, is modernizing again to serve as an example to its customers. Modern lighting and other facilities will be brought especially to the office spaces.

New Address

The Sterling Electric Co., Inc., electrical contractors of White Plains, N. Y., is now located in its new quarters at 5 Depot Plaza. The former address was 64 Orawaupum St. in the same city.

MORE THAN ONE thousand satisfied customers, is the proud record of W. E. Briscoe, Briscoe Electric Co., Knoxville, Tenn. Mr. Briscoe also has a modern store with a complete line of electrical appliances, fixtures and equipment.

Rive an Inspector

Phillip Rive, field man, for the past three years, for the Electrical Service League of British Columbia has been appointed a member of the electrical inspection staff for the city of Vancouver.

Education

In Ft. Wayne, Ind., chief inspector Art Welklin gives apprentice electricians a solid grounding in the National Electrical Code. The school, he says, is open to all employed apprentices, spends 60 per cent of classroom time on the Code and its interpretation. The course runs four years.

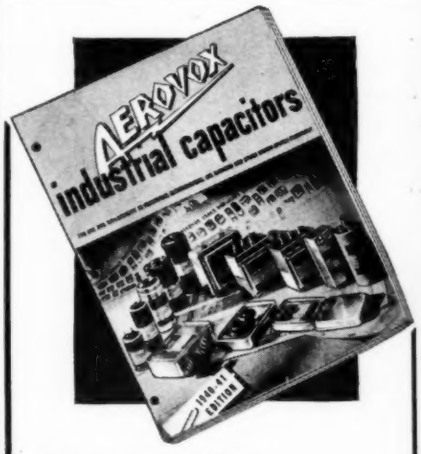
"IDEALITE"

Serviceable Fluorescent Reflectors
by
MULTI

GIVE YOU MANY WELL-PAYING INSTALLATION OPPORTUNITIES . . . . .

This "IDEALITE" Reflector was developed to meet the demand for a serviceable fluorescent unit low in first cost. Very efficient—easy to clean. Knockouts provided in back of wiring trough, at center, and each end for chain loops or stem suspension. Get our bulletin describing this and other new fluorescent units.

MULTI
ELECTRICAL MANUFACTURING CO.
1840 W. 14th ST., CHICAGO, ILL.



Yours for the asking . . .

● New 28-page Industrial Capacitor Manual is yours for the asking. Contains practical application data on motor-starting capacitors. Alphabetical listings of motor types and capacitor needs. Listings of electrolytic and oil capacitors. Handy cross-index listings of Aerovox types and motors served. • Ask your local refrigerator parts jobber for copy. Or write us direct.

AEROVOX
NEW BEDFORD, MASS.

West Allis Code Revised

The Common Council of West Allis, Wis., recently amended its electrical code to require that wires installed underground in dirt trenches, concrete or masonry be encased in rigid metal conduit or electrical metallic tubing with approved watertight fittings. Wires must be of lead covered or other specifically approved types. Three inches of concrete or its equal must cover conduits in dirt trenches for mechanical protection.

New Contractor

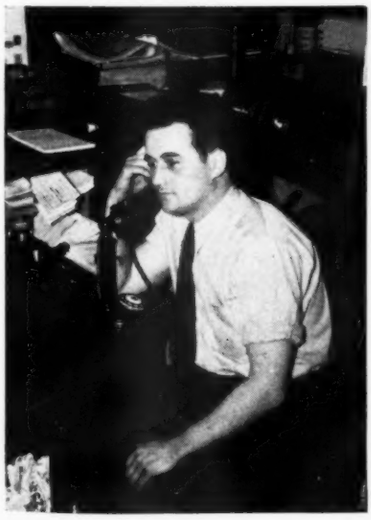
The Fairbanks Electric Contracting Company of Stamford, Connecticut, has recently filed certificates of incorporation. Incorporators are Mabel Wixson, Peter J. Ryan, and George R. Close.

Inspector Retires

Eugene N. Davis, wire inspector for Brookline, Mass., for the past forty years, has resigned and entered private life. Mr. Davis is 82 years old and first entered the electrical industry in 1884. He helped install the first telephone toll service between Cambridge and Boston. Daniel G. Lacey is the new Brookline Wire Chief.

Bergen Has Contractor Group

The Bergen Electrical League of Hackensack, N. J., has recently organized an Electrical Contractors Division. August Hasbrouck, Jr., a prominent Hackensack contractor who has had considerable experience in organization work, was chosen chairman of this new division of the League.

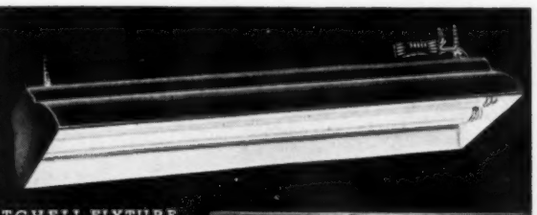


PINCH HITTER V. J. Smith carries on the business of the J. J. Smith Electric Motor Co., Philadelphia motor repair shop, while his dad enjoys an extended sojourn in the sunny climes of California.

MITCHELL—THE LINE THAT'S MAKING FLUORESCENT HISTORY

HIGHEST INTENSITY FLUORESCENT FIXTURE

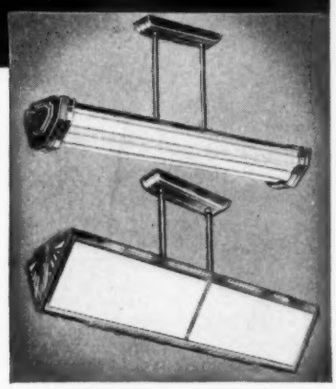
MITCHELL'S new No. 2026 Industrial Fixture using two of the new 100 watt 60-inch Fluorescent lamps. Precision-built to meet the demands of industry for highest intensity light levels. *Complete—Ready to Hang*

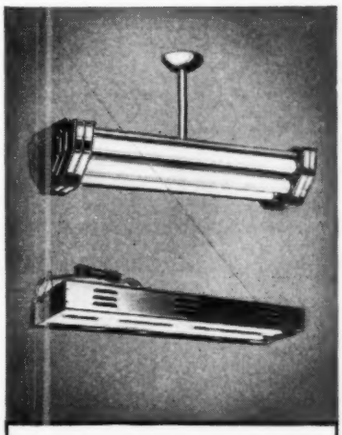


THERE IS A MITCHELL FIXTURE FOR EVERY APPLICATION

4 LIGHT OPEN UNIT
Another MITCHELL Fluorescent Best Seller. Uses four 40 watt 48 inch lamps. An efficient, handsome Commercial fixture of exceptional quality. Has chip-proof white enamel reflector. Comes complete, ready for hanging. Fleur-o-lier Approved.

4 LIGHT SHIELDED UNIT
An in-demand Commercial fixture using four 40 watt 48 inch lamps. Has acid-treated frosted glass panels for soft, even light diffusion. Smartly styled and built with typical MITCHELL quality. Completely wired. Fleur-o-lier Approved.





ALL-PURPOSE 100 WATT UNIT
A popular commercial fixture that installs in a jiffy. Ideal for store, office and commercial establishment. Uses four 20 watt lamps. Reflector is of chip-proof white enamel. Streamlined, handsome design. Built to famous MITCHELL precision standards. Fleur-o-lier Approved.

SHOW WINDOW UNIT
Another MITCHELL Fluorescent Best Seller. A fixture that transforms show windows into beautiful and effective display areas. May be placed end to end, or side by side. Uses two 40 watt 48 inch lamps for brilliant illumination. Fleur-o-lier Approved.

MITCHELL Fluorescent Fixtures are sold only through Franchised MITCHELL Lighting Division Distributors.

IT PAYS TO SPECIFY MITCHELL

Yes, it pays to do business on a QUALITY basis with MITCHELL — the line that's making the biggest reputation in the Fluorescent field. Specify MITCHELL — sell MITCHELL — the carefully engineered, ruggedly built line that's setting the pace for guaranteed quality, smart styling and full Fluorescent value.

FLEUR-O-LIER CERTIFIED. You can recommend and sell MITCHELL Fluorescent fixtures with confidence, because they're certified by Fleur-o-lier — and that means they meet more than 50 rigid specifications covering mechanical, electrical safety, and lighting requirements. They're Underwriters' listed, too.

A COMPLETE LINE. MITCHELL offers you America's most complete and dependable line of correctly engineered Fluorescent fixtures. You can specify a MITCHELL model for every conceivable lighting application.

NATIONAL ACCEPTANCE. Because MITCHELL represents Fluorescent lighting at its best; because MITCHELL fixtures are Fleur-o-lier Certified; because MITCHELL reputation is a byword in lighting—it is today the most universally accepted Fluorescent line on the market.

EASIEST TO SELL. Each MITCHELL Fluorescent fixture is a tested Best Seller, with a definite volume demand both in the commercial and industrial fields. Specify MITCHELL—sell MITCHELL—the easy-to-sell, fast-moving Fluorescent line.

Look for the famous Shield of Assurance on MITCHELL fixtures — YOUR assurance of quality and consistently easy saleability.

MITCHELL "Shield of Assurance" INGENUITY QUALITY VALUE

MITCHELL MFG. CO.
2525 N. CLYBOURN AVE., CHICAGO, ILL.
"A Great Name in Lighting"

PACKAGED LIGHTING

Fluorescent Units

● Here's a complete Smithcraft lighting package, ready to splice into present electrical lines. Units come complete with strip, ballasts, sockets, and two 4 ft. leads. All are assembled and tested for approval before packing. Standard aluminum finish on strip. Tough white enamel lacquer with high percentage of reflecting efficiency on all reflectors.

Smithcraft Industrial Fluorescent Units, especially designed to combine a high level of illumination and maximum lighting efficiency with a minimum of cost. Especially suitable for factory, mill, and showroom installations. List price $18.95.

Write for complete catalog showing strip and reflectors.

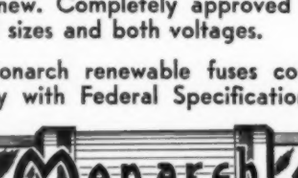
A. L. SMITH IRON CO.

Chelsea • • (Dept. F) • • Massachusetts

Monarch

Your Best Choice for-

RENEWABLE CARTRIDGE FUSES



● Quality workmanship and materials identify *all* Monarch Fuses. Of simple but sturdy construction, it's easy and quick to renew. Completely approved in all sizes and both voltages.

Monarch renewable fuses comply with Federal Specifications.

Monarch

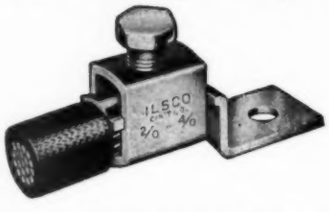
FUSE COMPANY, INC.

JAMESTOWN, NEW YORK

ILSCO

SOLDERLESS CONNECTORS

HAVE YOU TRIED The New Ilsco Lugs?



BUILT FOR OVERLOADS!

The new design — as passed by the Underwriters' Laboratories May 1, 1940.

Write for Samples today, —Along with the New Catalog.

.....No Obligation.....

ILSCO COPPER TUBE AND PRODUCTS, INC.

5629 MADISON ROAD — — CIN., O.

More Gossip

Larger Quarters

The Electric Motor Repair Company, formerly of 127 East Main Street, Waterbury, Conn., recently moved to their new headquarters at 313 Mill Street in the same city. Here they have a ground floor location with 150 per cent more floor area and better loading and unloading facilities to serve the steadily increasing demands of their industrial customers.

Civic Appointment

Anthony B. Rewald, electrical contractor of Burlington, Wisc., was elected president of the Chamber of Commerce of that city at the annual meeting of that body.

PUBLIC ACCEPTANCE of fluorescent lighting is steadily increasing in his territory, according to G. H. White of Ideal Electric Company, Knoxville, Tenn. Mr. White believes that customers should be educated as to the best lamps for their particular needs—all of which produces satisfied customers as well as increased lamp sales.

N. Y. Chapter I.A.E.I. Elects

The New York Chapter, International Association of Electrical Inspectors, chose the following officers to guide the activities of the group during the coming year: chairman, William A. Moore, Chief Inspector, Brooklyn Department of Water Supply, Gas and Electricity; vice-chairman, Arthur J. Scala, Engineering Inspector, Consolidated Edison Co.; secretary, Robert Rockford, Engineering Inspector, Consolidated Edison Co.; treasurer, Martin F. Cody, Asst. Electrical Engineer, Board of Education, N. Y.

John J. Bauer, president of John J. Bauer, Inc., is the contractor representative on the Executive Board. Other members of the board include representatives of the municipality, utilities, insurance organizations and manufacturers.

Emergency Switching

Home methods for getting lights on, such as baling wire around switches and pennies behind fuses are familiar to most of us. But near Fargo, North Dakota, one of Charley Wood's customers had a radically different problem to solve. We quote from a postcard, "Mr. Charles Wood, Fargo, North Dakota. Dear Sir: The yard light has gone haywire—couldn't turn it off on either switch. Had to break the bulb. Would you please come out and fix it soon. Yours truly—"

A simple, effective and thorough method —and probably fun.

***FOSTERING CREDIT** plan, to check credit of prospective customers, is one of the many activities of Edgar G. Pierce, electrical contractor of Peekskill, N. Y. In addition he finds time to experiment with high voltage fluorescent lighting and still wedge in a few good hunting trips a year.*

New Home for Newmark

The electrical contracting firm of Morris Newmark & Brother, Philadelphia, Pa., has recently purchased and occupied a four-story building at 1924 Arch Street. Their former headquarters was at 1814 Ludlow St.

The company occupies the first floor of the remodeled building which provides general and private offices, a consulting room and estimating and drafting room. A connecting passageway leads to a rear building which houses a large shop and warehouse for stock and equipment. The rest of the main building is rented as offices.

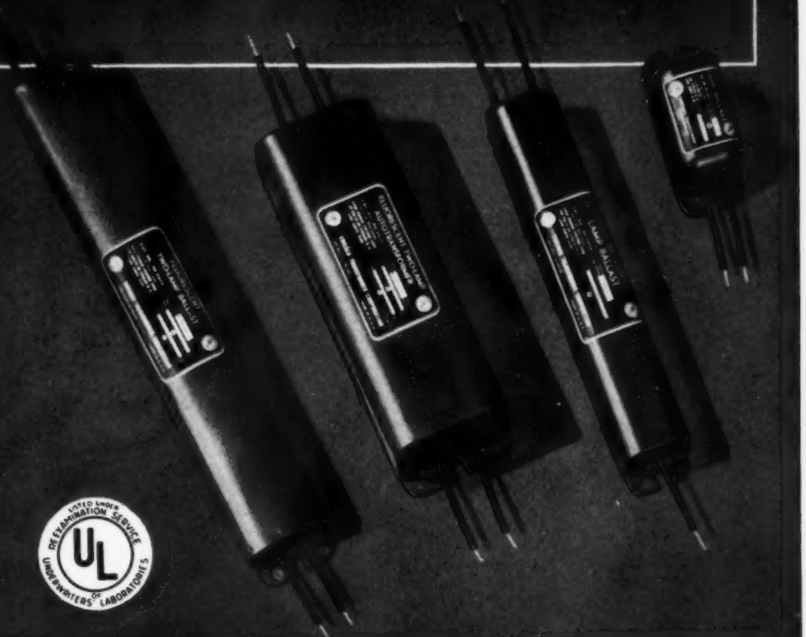
Installation Booklet

The Buffalo Electric Company, one of the largest electrical construction organizations in New York State has just issued a 32-page construction booklet filled with pictures describing its varied services to the public. A staunch supporter of the old saying "Seeing is Believing", the company uses this medium to bring its installations to the prospective customer to show him what can be accomplished with good engineering and construction ability.

FLUORESCENT
Lamp Ballasts

by Chicago Transformer . . . *ESPECIALLY DESIGNED FOR RELIABILITY . . . LOW LOSSES . . . ABSOLUTE MINIMUM OF HUM . . . AND HIGH POWER FACTOR*

Here are ballasts built to maintain a new high in operating performance—A line so constructed that losses and hum are reduced to a minimum—New units to help you give the utmost in customer satisfaction • Available in 15, 20, 30 and 40 Watt sizes, single and 2-lamp installations, for all voltage ranges, 50 or 60 cycles, and in High Power Factor types, complying with lamp manufacturers specifications, and listed by Underwriter's Laboratories • Mail the coupon, today, for full details on these business-building fluorescent lamp ballasts.



CHICAGO TRANSFORMER CORPORATION
CHICAGO, ILLINOIS
U.S.A.

Chicago Transformer Corporation
3505 W. Addison St., Chicago, Ill.
Please send your Fluorescent Lamp Ballast bulletin and discount sheet. I understand that this does not obligate me in any way.

Name.....
Address.....
City.....*State*.....

EQUIPMENT News

Lighting Fixtures

The new 200-watt C-205 Miralume fluorescent lighting fixture has been designed for commercial or interior lighting. It has plastic diffusing panels and bottom louvers. It is 49-in. long, 14½-in. wide and 7½-in. high and comes complete with four 40-watt fluorescent lamps in either daylight or white finish. Hygrade Sylvania Corporation, Salem, Mass.

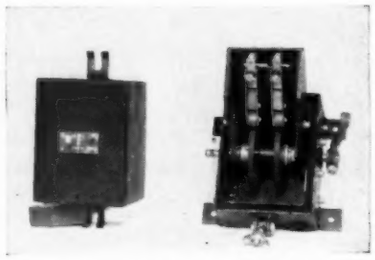
HYGRADE FLUORESCENT FIXTURE

■

Conduit Fittings

A combination of these electrical conduit fittings can be handled in the same way as a mitered stove-pipe elbow. Consisting of curved segments, deflection couplings and sweeps, the fittings facilitate the by-passing of obstructions not anticipated in the design period. They permit changes in direction in one or more planes in a short distance, also assembly of a spiral type of bend where it is necessary to change direction slightly in one plane and then swing into another plane. Long radius changes of direction can be made when two or more fittings are separated by straight sections of duct of the desired length. Fittings are of asbestos-cement composition and made to fit both Transite asbestos-cement conduit and the thinner-walled Transite Korduct. Johns-Manville, 22 East 40th Street, New York, N. Y.

JOHNS-MANVILLE FITTINGS



WESTINGHOUSE LIMIT SWITCH

Limit Switch

This new cam-operated limit switch with contacts arranged to swing open, is designed for control circuits of such devices as hoists, industrial trucks and trolley coaches. It is available with ratings of 2 amperes at 600 volts d.c. and 25 amperes at 110 volts a.c. It has two contacts, either or both of which may be normally closed or normally open. Contacts are mounted on Micarta fingerboard. Switch is housed in weatherproof case. Four mounting brackets are provided. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

■

FOSTORIA BRACKET FIXTURE

Adjustable Fixture

A new series of Fostoria fluorescent fixtures known as the No. 600 series. Units have adjustable tubular bracket arms which permit use of fixture in almost any position desired. An assortment of bases permits attachment of unit to almost any piece of machinery or equipment. Models are of the small type using open end reflectors with auxiliaries and push button switch mounted in the wiring channel on top of the reflector. Units are available for use with one fluorescent tube, either the 15- or 20-watt size. Fostoria Pressed Steel Corp., Fostoria, Ohio.

G E TRI-CLAD MOTOR

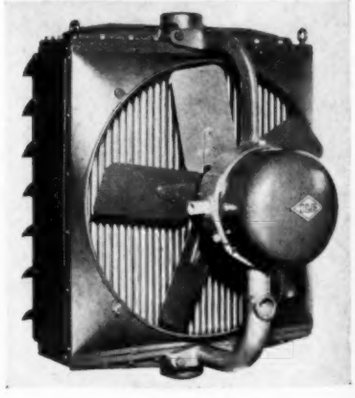
Motor

A line of new polyphase induction motors, in integral horsepower sizes to conform with new industrial trends, processes and practices, known as Tri-Clad. Has cast iron frame and end shields with no openings above center line. Windings are synthetic insulated "Formex" wire. Improved bearing design, lubricating system and double end ventilation. Features include: larger conduit box that can be mounted in four positions; permanent identification of leads; reversible stator; four position end shields; converting from ball to sleeve bearings or vice versa requires changing only end shields, bearings and caps; oil filler gauge can be located on either side. General Electric Co., Schenectady, N. Y.

■

Unit Heater

This new Ilg unit heater has been developed for use in textile mills and places where lint and other substances adhere to fin surfaces and clog up coils of standard type heaters. Unit can be suspended either from ceiling or wall and has an easy running propeller fan, which is driven by enclosed self-cooled motor. Self-cooling feature protects motor from "slow-roasting" and counteracts heat radiated from coils when motor is idle. Unit is made in three sizes. Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.



ILG TEXTILE UNIT HEATER

Certified* FLEUR-O-LIERS

The Greatest Name in Fluorescent Fixtures

4 Reasons Why They'll Sell Faster!

1 **Certified* FLEUR-O-LIERS** assure high quality fixtures and satisfactory performance for your customers. Over 40 leading manufacturers participate in the FLEUR-O-LIER program which is based on 50 standards of electrical, mechanical and illuminating excellence.

2 **Electrical Testing Laboratories,** nationally known testing organization, *certify* FLEUR-O-LIERS as meeting 50 rigid performance-specifications* for good light—safe, reliable service as set up by MAZDA lamp manufacturers.

3 **Certified auxiliaries** (ballasts and starters) embodied in every Certified* FLEUR-O-LIER assure the user of balanced, coordinated operation.

4 **Certified* FLEUR-O-LIERS** are nationally advertised—month in, month out, in Newsweek and 16 trade and business publications. Here is strong selling copy directed to YOUR markets . . . helping you sell faster.

Inspection of physical strength and electrical safety—FLEUR-O-LIER testing at Electrical Testing Laboratories.

FLEUR-O-LIER
The Manufacturer guarantees by affixing this label that this Fluorescent Luminaire is a duplicate of samples found by periodic examination to comply with the minimum requirements at set up in the
"SPECIFICATIONS FOR LUMINAIRES, FITTINGS AND AUXILIARIES FOR FLUORESCENT LAMPS"
which are sponsored by the Manufacturers of Mazda Lamps.
ELECTRICAL TESTING LABORATORIES
A Copy of This Certificate Should
ETL
Appear upon Each Unit or Package
THIS CERTIFICATION IS CONTINGENT UPON EMPLOYMENT OF CERTIFIED AUXILIARIES OF OVER 85% POWER FACTOR

Over 75 different designs now available, for stores . . offices . . factories, in a wide price range

LOOK FOR THIS LABEL

It is your protection. Electrical Testing Laboratories certify *that FLEUR-O-LIERS have met with 5 specifications for Lighting Effectiveness—6 for Electrical Safety—18 for Mechanical Soundness—14 for Electrical Excellence . . . as set up by MAZDA Lamp manufacturers. All Certified* FLEUR-O-LIERS must be equipped with auxiliaries (ballasts and starters) certified by E. T. L.*

FLEUR-O-LIER
Manufacturers

Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements

TEAR OUT AND MAIL

Fleur-O-Lier Manufacturers • 2122 Keith Bldg., Cleveland, Ohio

Please send me helpful information about Certified FLEUR-O-LIERS, packages of indoor daylight for stores ☐ offices ☐ factories ☐

Name _____

Address _____

City _____ State _____

New Glass Protective Coater Speeds Welding Operations

Newark, N. J.—The John C. Dolph Company announces the introduction of a new Glass Protective Coater to be used in welding operations. This product, known as DOLPH'S No. 253 Glass Protective Coater, is applied to drop lamps, port hole lights or other glass surfaces. It is absolutely transparent and is not affected by heat. Tests conducted at many shipyards have shown that welding spatter does not break lamps treated with DOLPH'S Glass Protective Coater as readily as is the case with untreated lamps. It also protects port hole glasses from becoming pitted during ship construction. This product should find many uses wherever welding is being done. The DOLPH Company will send a lamp treated with No. 253 Glass Protective Coater on request.

Electric Motor Life Increased Over 300%

Oklahoma City, Okla.—Many years ago with 75 cars in service the Oklahoma Railroad had to return 135 motors for rewinding. The average life of an electric motor was 6 months. After using DOLPH'S CHINALAK Black Baking Varnish on all motor windings for three years, they found that the average life of a motor was 20 months—an increase of over 300%. With 125 cars in service only 75 motors had to be rewound. All users of electric motors can save money by changing to CHINALAK. Alert motor repair shops use CHINALAK exclusively to insure customer satisfaction.

Prominent Chemical Plant Solves Corrosion Problem

Grasselli, N. J.—At the plant of a prominent chemical company, process fumes were causing considerable damage. Not only was corrosion causing motor failure, but metal girders were being eaten away. Many types of insulating materials were tried on motor windings but conditions were so severe that motor breakdown was a very frequent occurrence. Finally, they tested DOLPH'S SYNTHITE No. 10 Red Insulator. The laboratory tests indicated that this was the best material they had tried. This report was confirmed when motor windings in the plant were treated. Results were so satisfactory that this company is now treating all their electrical equipment with DOLPH'S SYNTHITE No. 10 Red Insulator. Additional data regarding this product may be obtained from the JOHN C. DOLPH COMPANY, 168A Emmett Street, Newark, New Jersey.

ADV.

EQUIPMENT News

[FROM PAGE 96]

Fluorescent Unit

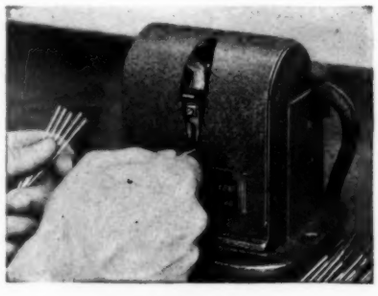
The Benjamin RLM "Stream-Flo 60" is designed to accommodate two 60-inch 100-watt white fluorescent lamps. Available with a series of apertures in the top of the reflector directly over each lamp to permit about 2½ per cent of light output to pass upward to light ceiling areas to diminish dark ceiling contrasts. Protection against glare is provided by a shielding angle of 14 degrees and closed-end reflector constructon. Fused porcelain enamel reflecting surface has a reflection factor of 79 per cent or more. Units available with or without apertures in top of housing. Benjamin Electric Mfg. Co., Des Plaines, Ill.

BENJAMIN FLUORESCENT UNIT

■

Wire Stripper

This new type of wire stripper quickly burns the insulation, and suitable for stripping cotton, silk and rubber coverings from fine stranded or solid wires. Blunt blade cannot harm the finest wires, it is claimed. Wires are inserted between electrically heated blades in stripper head. Pressing foot pedal brings blades against insulation and two parallel grooves are burned down to the conductor. Each blade has individual heat control and transformer. Distance between blades and length of stripping is adjustable. Parts as furnished include standard head, control box with transformer, water drawer, foot rest, pedal and connecting rod. 110-120-volt, 50-60 cycle a.c. standard. Other voltages and frequencies available. Ideal Commutator Dresser Co., 1041 Park Ave., Sycamore, Ill.



IDEAL WIRE STRIPPER

WOLVERINE
SOLDERING LUGS

- *High-Conductivity*
- *Square-End*
- *Uniform Dimensions*

BUY FROM YOUR JOBBER

WOLVERINE TUBE CO.
DETROIT, MICHIGAN

BADGER
Synchronous
ELECTRIC TIME SWITCHES

CONTRACTORS LIKE THEM BECAUSE:
they are dependable and easy to install

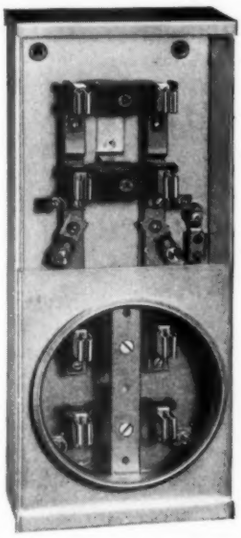
USERS LIKE THEM BECAUSE:
of economical operation and low cost

The Badger line of Time Switches is always in demand by Contractors who want dependability, accuracy, and the right type for a specific need. They know from experience that this is the line that gives them successful, profitable installations. They know when they install Badger Synchronous Electric Time Switches for their customers they are giving them complete satisfaction—accurate timing, economical operation, dependable service. You can't go wrong on Badger. Write for more particulars or see your Wholesaler.

RELIANCE AUTOMATIC LIGHTING COMPANY
1937 MEAD STREET RACINE, WISCONSIN

Meter Troughs

A line of standardized socket meter troughs, designated as No. 3 and 3A, has been developed. Individual covers for each meter position permit work on any one meter without disturbing others. Solderless connectors on line side will take up to No. 3/0 wire and on load side up to No. 4/0. No. 3A troughs are provided with disconnects on load side. Both types are furnished either with or without busses, in outdoor or indoor types. Square D Company, 6060 Rivard Street, Detroit, Mich.

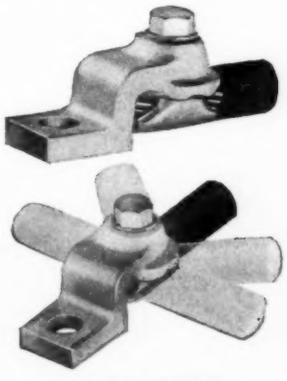


SQUARE D METER TROUGHS

■

Connectors

This new Versi-Line connector, Type EA, makes cable connections easier and reduces cost. The new element is rotatable cable clamp. Conductors can be joined to connectors at any angle. Each size accommodates a range of conductors and only six sizes are necessary to take conductors from No. 8 stranded cable to 1,000 MCM. There are no exposed threads. Conductor is surrounded and gripped by connector eye and cable strands are protected. Burndy Engineering Co., Inc., 459 East 133d Street, New York, N. Y.



BURNDY VERSILUG

WIREMOLD

Carries Current to Work

FOR NATIONAL DEFENSE

ADEQUATE WIRING SERVES AND SAVES

WIREMOLD

Business Building Check List

Lighting Modernization
Wiremold Surface Metal Raceways and Fittings for extension, installation, or relocation of wiring for BETTER LIGHT.

Fluorescent Work Lighting
Wiremold Fluorescent LINE-O-LAMPS, Wired and Unwired Units, and Industrial Units for both General and Local work Lighting.

Plugmold
The Wiremold Multi-Outlet Assembly in two sizes for home, office and factory. Ideal for work bench, inspection table and similar places where many convenience outlets are needed for electric hand tools, lamps, instruments, appliances, etc.

Pancake
Wiremold Overfloor Wiring System carries power, light, telephone, etc., to isolated desks, machines or appliances.

Signal System Wiring
Using Wiremold Systems "on the surface". Quickly installed, always accessible.

Opens wide opportunities for alert Contractors . . . .

THAT'S a statement worth thinking about! Thousands of feet of Wiremold Products have already gone into National Defense work. They symbolize a vital contribution that Wiremold, and the men who install Wiremold, can make toward National Preparedness . . . the contribution of MORE and better electrical arteries through which the current of accelerated industry can flow unimpeded.

Wiremold supplies the increased wiring capacity thousands of factories and offices need . . . easily and above all, QUICKLY.

Wiremold supplies the new, cool, "daylight" illumination of FLUORESCENT Lighting . . . with correctly designed, easily installed, approved equipment for plant, office or drafting room.

Wiremold Systems and methods in most cases offer the great added advantage of installation WITHOUT INTERRUPTING work.

Check the list at the left. Then use your Wiremold knowledge and the help that Wiremold representatives and engineers can give you in BUILDING-UP this important part of your business NOW.

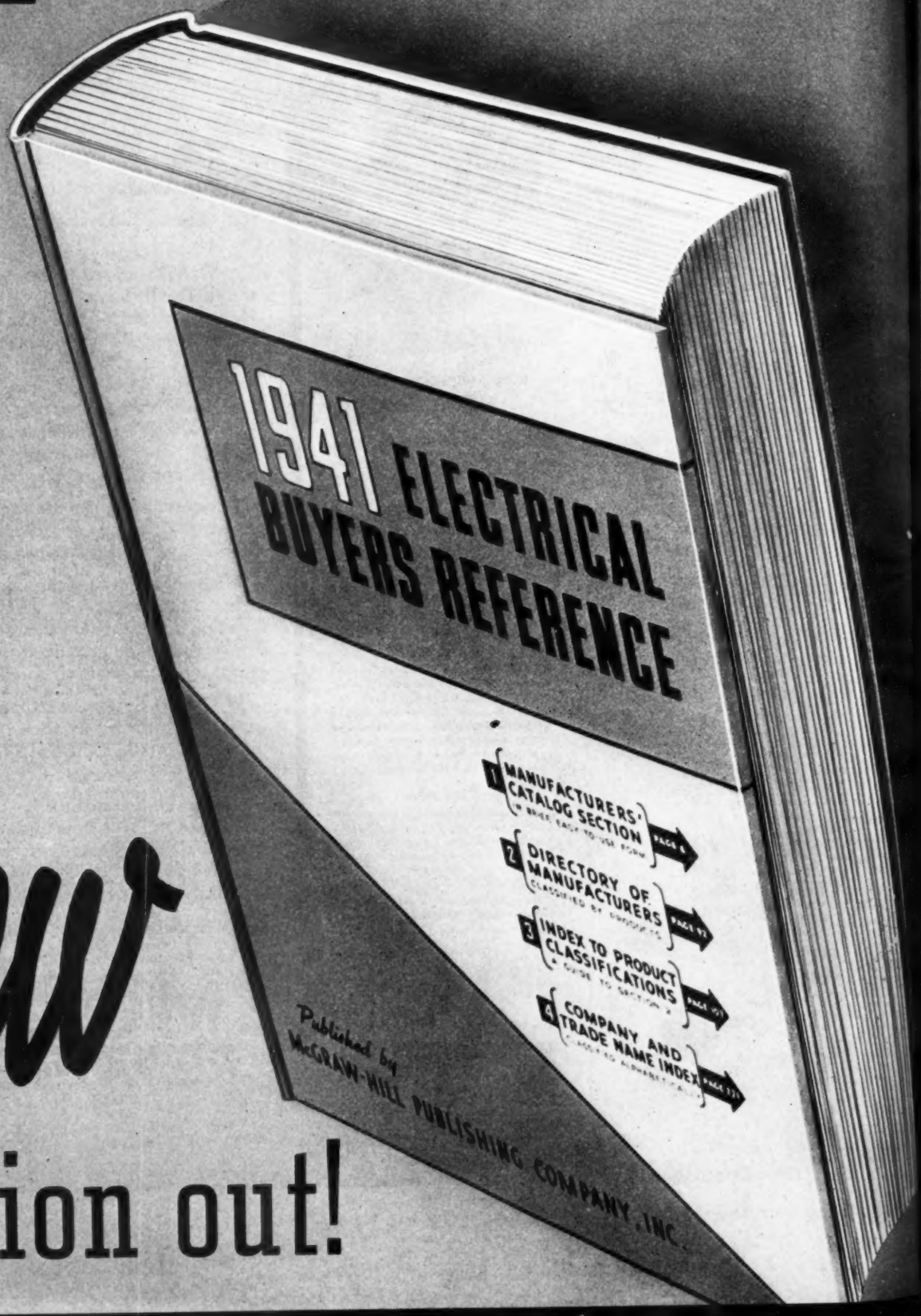
The Wiremold Company, Hartford, Conn.

WIREMOLD

CARRIES CURRENT TO WORK

"Plugmold" Multi-Outlet Assembly | Wiremold Fluorescent Lighting Equipment | "Pancake" Wiremold Overfloor Wiring System | Wiremold Surface Raceway Wiring Systems

552 Solid Pages of Up-to-Dat B


1941 ELECTRICAL BUYERS REFERENCE
1 MANUFACTURERS' CATALOG SECTION
2 DIRECTORY OF MANUFACTURERS
3 INDEX TO PRODUCT CLASSIFICATIONS
4 COMPANY AND TRADE NAME INDEX
Published by McGRAW-HILL PUBLISHING COMPANY, INC.

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Buying Data For You!

238 Manufacturers Unite to Give You Helpful Catalog Data on Hundreds of Electrical and Allied Products

●Wait till you see it! And when that big 1941 Edition of the Electrical Buyers Reference comes to your desk, thumb through it and note the wealth of information on manufacturers and products it contains—completely revised—up to the minute in every respect. No need to shuffle through bales of miscellaneous booklets now. Here, between two sturdy covers you've got the condensed catalogs of 238 manufacturers...plus classified sections listing manufacturers, products, trade names, etc.—all at your fingertips for instant reference, quick as the flip of a page!

This 1941 Edition breaks all records for value to the user. Keep it within arm's reach to save time and money.

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ELECTRICAL BUYERS REFERENCE

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IDEAL

"Profit-Makers"

New

IDEAL

FISH TAPE, REEL AND PULLER

No. 00 "Handy" size

- Prevents breakage—keeps fish tape under control.
- Complete with 50 feet of 1/8" x .045" tape.
- 3 tools in one—all **for $1.50!**

IDEAL "WIRE-NUTS"

The Solderless, Tapeless Wire Connector that makes better wire joints, and at less material cost.

New IDEAL "SNAP-TITE" SWITCH BOX SUPPORTS

- Holds switch box in composition walls.
- No screws or special tools required.
- Fits all standard boxes.

New IDEAL BX ARMOR CUTTER

- Cuts armor from 2 or 3 wire No. 12 or No. 14 BX in one operation.
- No more nicked insulation, shorts or wasted BX.
- Pocket size. Inexpensive.

New IDEAL JOIST BORING MACHINE

- Easily assembled.
- Bores at any angle through joists, rafters, etc.
- No climbing—no stooping—no straining.
- Works 11 ft. above or below floor level.

New IDEAL TEST-GLO

SAFE! Tests electrical and radio circuits motors, fuses, etc. from 80 to 550 volts, A.C. or D.C.

IDEAL COMMUTATOR DRESSER COMPANY

1041 Park Avenue Sycamore, Illinois

SALES OFFICES IN ALL PRINCIPAL CITIES

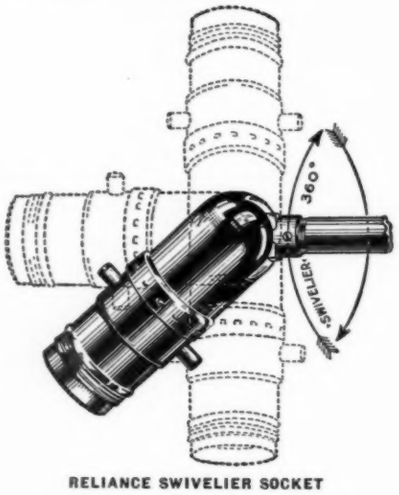
In Canada: Irving Smith, Ltd., Montreal, Quebec

EQUIPMENT News

[FROM PAGE 99]

Lamp Socket

This new lamp socket, known as Swivelier, is for industrial, commercial and residential use. Some of the features claimed are—adjustable to 90° angle; can be rotated to 360° full circle; wires cannot twist due to special stop; unit will stay put in any position; no exposed wires; machine vibration will not cause socket to work loose; can be attached to a pipe to the machine itself. Reliance Devices Co., 14 Liberty Street, New York, N. Y.

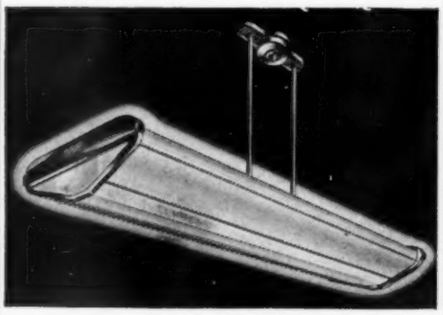


RELIANCE SWIVELIER SOCKET

■

Luminaire

A new fluorescent luminaire, called Excelux, has been developed. It is for semi-indirect lighting. Full-screened lamp diffusion is effected with a glass or plastic lamp shield to minimize glare. For maintenance, the glass or plastic cover lowers away in a retaining hinge. Shield is held between aluminum ends by four satin rods. It uses four 40-watt lamps and is available for close-ceiling or suspended mounting. Edwin F. Guth Co., 2615 Washington Blvd., St. Louis, Mo.



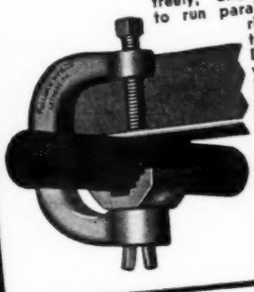
GUTH EXCELUX

FLOOR BOXES *and* WIRING SPECIALTIES

No. 130 Adjustable Water Tight Floor Box

No. 130 Box with No. 207 Bell Nozzle. Cut-away view illustrates how tapered unit receptacle fits tapered opening in adjustable ring. Cover plate 3½"—overall height 3½".

No. 470 Pipe or Conduit Hanger



Pipe support turns freely, allowing pipe to run parallel or at right angles to beam. Does away with drilling or use of straps. Handles ½", ¾" and 1" size pipe to steel beams ⅜" thick.

No. 330 "Latrobe" Tom Thumb Utility Outlet

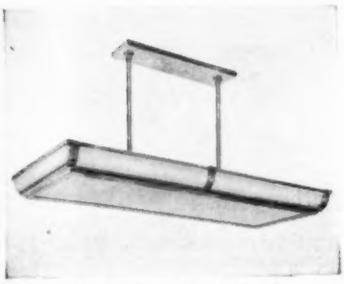
To be used in wood installations and other locations free from moisture or mechanical injury.

• The *Latrobe Line* is complete for all residential, commercial, and industrial requirements. In addition, the entire line is designed with the idea of reducing installation time . . . an important point to consider when selecting floor boxes and wiring specialties

Write for details TODAY!

FULLMAN MFG. CO.

LATROBE • PENNA.



WESTINGHOUSE LUMINAIRE

Luminaire

A new ornamental fluorescent luminaire, CL-160, is designed for general commercial lighting installations in offices, schools, stores and public buildings. Available with three types of diffusing media for different light distribution requirements. Unit uses four 40-watt, 48-in. fluorescent lamps, either white or daylight or combinations of both. A rectangular steel ceiling plate supported by knurled rings, slips down over stem for free access for wiring and installation. Lamp starters are the glow switch type. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

■

Lighting Unit

This fixture, known as the Captain, is a four lamp fluorescent unit for store lighting. The placing of the fluorescent lamps in a circular formation provides an even illumination over a wide area. A white enameled reflector, housing the ballasts, starters and compensators, is suspended from an ornamental stem. It accommodates four 40-watt fluorescent lamps and uses the two-lamp ballasts with separately mounted starters. The F. W. Wakefield Brass Co., Vermilion, Ohio.

WAKEFIELD LIGHTING UNIT

■

Fuses

Shawmut C-Quick glass plug fuses are now available. Some of the features are glass tops—complete insulation; high visibility before and after blowing; rating reads by color and by figure in any position—double and instant identification from any angle. Chase-Shawmut Company, Newburyport, Mass.

PICK YEAR 'ROUND PROFITS RIGHT OUT OF THE AIR!

Free

SENSATIONAL 1941 "DOUBLE-DUTY"

SALES DEMONSTRATOR

AND TESTED, SALES-MAKING

PROFIT PORTFOLIO

Ask Your Jobber

FOR YOUR DEMONSTRATOR!

Go right after those " 'round-the-corner" sales! Every building—home, store, garage, factory, school—houses *your* prospect! There's a $50,000.00 volume waiting for you in each 10,000 population. And all sales are made *without* money-wasting trade-ins, *with* full profit margins!

This proposition is hot! Phone, wire or write your ILG distributor or nearest ILG office—find out how you can get (1) your FREE easy-to-carry demonstrator (for window or counter display, for home or office demonstration), (2) your FREE dealer kit of tested selling helps. Act now—get a head start on competition and profits for 1941!

ILG ELECTRIC VENTILATING CO.
2874 N. CRAWFORD AVENUE, CHICAGO, ILLINOIS
Offices in 43 Principal Cities

ILG

Vitalized* VENTILATION
AND AIR CONDITIONING
*AIR CHANGE...NOT JUST AIR MOVEMENT!

What You Get
IN THE PROFIT PORTFOLIO

★ Complete "Plan Book" featuring sales planning, man power, instructions for use of demonstrator, suggested letters, newspaper ads, radio announcements, time payment plan, publicity articles.

★ Mailing broadsides to send to *your* trade.

★ Big, colorful, 25x38" store posters.

★ Copies of new Ilg catalogs.

NATIONALLY ADVERTISED to *Time* Magazine's 800,000 able-to-buy familes in a year 'round program, with these money-making demonstrating displays featured in every ad. We tell 'em — you sell 'em.

At right — Type S-O Heavy Duty Lug. Pure copper. Rigid and sturdy with extra contact area. Sizes from 35 to 400 amps. Underwriters approved.

At left — Type S-M, low cost, one-piece design. Compact and strong. May be soldered if desired. Sizes from 50 to 400 amps.

Sherman
SOLDERLESS LUGS
Make QUICK *Connections That Are* PERMANENT

Sherman solderless type lugs can be absolutely depended on—strong, rigid, permanently tight. Assembled in a jiffy. May be used over and over again. Interchangeable with standard soldering lugs. WRITE FOR SAMPLES.

H. B. SHERMAN MANUFACTURING CO.
BATTLE CREEK, MICHIGAN

NEW *Fluorescent* LIGHTING *for* EFCOLITE

M. 304-48
4-40 Watt Bulbs
High Power Factor

M. 304-24
4-20 Watt Bulbs
High Power Factor

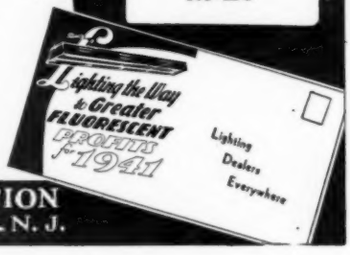
N O W !

Shadowless **FLUORESCENT—**

THERE'S A REASON WHY THIS NEW, EASY-TO-HANG FLUORESCENT UNIT "SELLS ON SIGHT"

Scientifically shaped reflecting areas eliminate shadows. Chip-proof, Hi-Bake White Enamel reflecting surfaces yield maximum, efficient light. Exterior finishes are smart and durable. All these features and many more, make this and other numbers of the new Efcolite "M" Line the "Best Buy" for 1941.

SEND FOR BULLETIN M-20



Write, Wire, or Phone for information!

EFCOLITE CORPORATION
TRENTON, N. J.

EQUIPMENT NEWS

[FROM PAGE 103]

Contactors

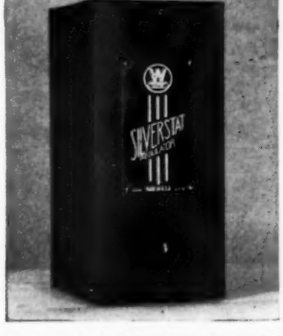
Magnetic a.c. contactors, Bulletins 501 and 502, general purpose, are furnished in sizes 0 and 1. Suitable for handling single phase or polyphase a.c. motors, or for use on flexible relaying devices for control systems such as used in machine tools, switchboards and special control panels. Some of the features are 3-point ball bearing suspension of movable electro magnet assembly; double break silver-to-silver contacts; movable and stationary contacts are interchangeable with those of manual and magnetic starters; contactors are vertical solenoid type; magnets are "E" shaped. Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.

COLT CONTACTORS

■

Voltage Regulator

For the automatic voltage control of small a.c. and d.c. generators, a new quick-acting rheostatic type regulator has been developed. Known as Silverstat Junior regulator, it is available in d.c. ratings up to 25 kw. and a.c. ratings up to 44 kva. Voltage of machine to be regulated is connected across regulator coil and any change in voltage results in a corresponding change in the magnetizing effect of the coil on the magnetic circuit. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



WESTINGHOUSE VOLTAGE REGULATOR

Attachment Plugs

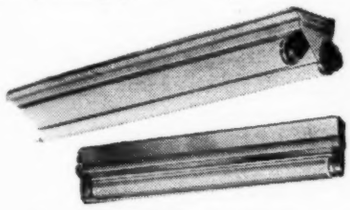
An "anchor" has been built into these attachment plugs for closer relations between convenience outlets and cords. It is designed to increase holding power on both old and new convenience outlets without distortion of outlet contacts. The new prongs can be supplied on several types and sizes of all-rubber attachment plugs. Prongs are designed to eliminate excessive stress on outlet contacts. General Electric Company, Bridgeport, Conn.

G-E ATTACHMENT PLUG

■

Fluorescent Channels

These new fluorescent channels have flush mitered snap-on covers and screwdriver snap release. Available in one- or two-lite "V" models. Units may be had in 4-, 6-, 10- and 12-foot sections. Take standard sockets, starters and ballasts for 12-, 24-, 36- and 48-inch fluorescent lamps. Channels are for flush mounting in plaster or may be mounted directly to ceiling trusses or suspended with chains and conduit. Wilson Lighting, Inc., 411 S. Clinton St., Chicago, Ill.



WILSON FLUORESCENT CHANNELS

■

Fluorescent Lamp

A new 100-watt mazda fluorescent lamp has been developed. It is 5-feet long and 2⅛-inches in diameter, and available in the 3500° white color. It is intended for use in stores, offices, industrial plants and elsewhere. Allowing higher mounting heights, it will reduce size and number of fixtures necessary to supply a given amount of light. New lamp has a rated initial output of 4400 lumens and a rated life of 2000 hours. Westinghouse Lamp Div., Bloomfield, N. J.

WESTINGHOUSE LAMP

WHEN SPEED IS ESSENTIAL

You'll save time using G-E White because it is made of easy bending mild steel galvanized by the hot-dip process and Glyptal-coated inside and out. It is easy to work with and install. Threads are clean and accurate. Seams will not split. Every length of G-E White is like every other length of the same size. Quality is uniformly high. A complete line of boxes and fittings helps to speed installations.

OTHER G-E CONDUIT PRODUCTS
Every one a leader in its class

G-E Black Rigid Conduit
Flexible Conduit
Electrical Metallic Tubing
Fiberduct Underfloor Duct
BX Armored Cable
BraidX Non-metallic Sheathed Cable
Multilets (Conduit boxes)

For further information see the nearest G-E Merchandise Distributor or mail the coupon for a G-E Conduit Products catalog.

General Electric Company
Section C-182
Appliance and Merchandise Dept.
Bridgeport, Conn.

Sirs: Please send me a G-E Conduit Products catalog, Pub. No. 53-1

Name

Address

City State

GENERAL ELECTRIC

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : "OPPORTUNITIES" : EQUIPMENT
BUSINESS : : (Used or Resale)

UNDISPLAYED ——RATES—— DISPLAYED

15 CENTS A WORD. MINIMUM CHARGE $3.00
Positions Wanted (full or part time salaried employment only), ½ the above rates payable in advance.
Box Numbers—Care of publication New York, Chicago or San Francisco offices as 10 words.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.
The advertising rate is $8.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by February 21st will appear in the March issue, subject to limitations of space available.

POSITION VACANT

FIRST-CLASS ELECTRICIAN wanted, preferably with college training, experienced in Industrial Maintenance and construction. Good opportunity for advancement. State experience, education and salary desired. Address: P. O. Box 708, Wilmington, North Carolina.

POSITION WANTED

THOROUGHLY EXPERIENCED Salesman, Estimator, Layout Man, Foreman, Power and Lighting. Permanent connection desired. PW-18, Electrical Contracting, 330 W. 42nd St., New York, N. Y.

USED EQUIPMENT

ELECTRICAL EQUIPMENT
FROM THE
San Francisco Bay Exposition
HAS HAD ONLY 10 MONTHS USE
$500,000
OF
FLOODLIGHTS
SEARCHLIGHTS
STREET LIGHTS
MOTORS, SWITCHES
COPPER CABLE
PANELS, etc.
Write for Catalog
DULIEN STEEL PRODUCTS, INC.
of California
Treasure Island
San Francisco, California

You Can Find It at ERIE
One of the most Complete Stocks of Transformers and Electric Motors, write us we have what you want.
Special for this month
6—200 KVA G. E. late Type Transformers. Pri. 2200/4600 Volts. Secondary 220/440 Volts with Oil ready to ship.
1—75 KW Generator with direct Connected exciter. 60 Cycle 3 phase 220/440 Volts, 1200 RPM. Base Pulley and Panels complete. Write, wire or phone.
ERIE ELECTRIC CO., Inc.
129 Church St., Buffalo, N. Y.

New "SEARCHLIGHT" Advertisements
received by February 21 will appear in the March Issue, subject to space limitations.

OPPORTUNITY TO
MAKE MONEY
You can buy completely overhauled and performance tested electric motors, generators, transformers, MG sets, welders, platers, etc., from Moreco and *Resell* at competitive prices and still make plenty profit. Send us your inquiries. We co-operate with dealers.
Here's a Bargain—Can you sell it?
125 KW. Gen. Elec. late type M.G. Set. 125 volt DC generator—220/440 volt 1200 RPM motor.
THE MOTOR REPAIR & MFG. CO.
1560 Hamilton Ave. Cleveland, Ohio

Poor Aladdin . . .

The best service at Aladdin's command was rubbing a lamp and WISHING for what he wanted. YOU have "Searchlight" to help you find the buyer or the equipment you want, the employer or the man you want, the "opportunity" you offer, or want, of special interest to the men who read *Electrical Contracting*—Can "Searchlight" Serve You?

EQUIPMENT News

[FROM PAGE 105]

Luminaire

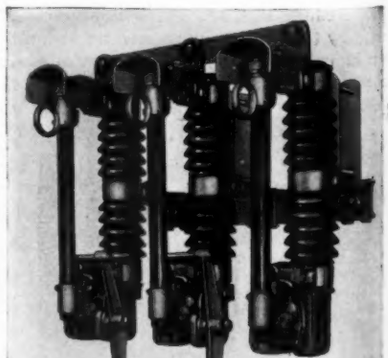
The Stratoliter fluorescent luminaire is a four light fixture. It is made for 24-in. or 48-in. lamps and may be used for store, office and general illumination. It may be suspended with stems and canopy or mounted flush on ceiling. Available in either plated combination of satin and polished chrome or a baked pewter finish. Body is finished in baked white enamel. Pickwick Metalcraft Co., 489 Broome Street, Street, New York, N. Y.

PICKWICK STRATOLITER

■

Cutouts and Reclosers

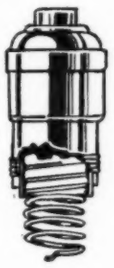
The new Type STD and RTD open drop-out cutouts and reclosers are designed for light and medium duty service on distribution lines and substations operating at 2300-13200 volts. Provision is made for complete, positive separation of arcing terminals. Flexible cable of link is pulled straight out of tube to clear arcs quickly, even in case of low fault currents. Toggle action releases and drops fuse tube open after fault is cleared. Reclosers are made up of two or three of the single cutouts with addition of automatic circuit-reclosing parts. All types are furnished for three voltages—5000, 7500/12500, and 15000. Fuse tubes are rated at 100 amperes. Schweitzer & Conrad, Inc., 4435 Ravenswood Ave., Chicago, Ill.



S & C CUTOUTS AND RECLOSERS

Lamp Lock

These lamp locks are for brass and porcelain sockets, also weatherproof socket with locking device attached. Device for locking electric light bulbs makes use of convolutions on outside of threaded brass ferrule. Large end of tapering coil spring is screwed into socket, leaving several turns of spring exposed. Protecting ring with notch at top is dropped over light bulb and bulb screwed into socket, engaging exposed spring turns in thread on bulb base. Laduby Company, 255 Bradley Street, New Haven, Conn.



LADUBY LAMP LOCK

■

Industrial Unit

The Smithcraft industrial fluorescent unit is for factory, showroom, or mill installation. Body of unit is finished in either aluminum or bronze and reflector is in baked enamel. Unit is wired with Tulamp ballast offering high power factor correction and elimination of stroboscopic effect. It is grounded and conforms with electrical requirements. A. L. Smith Iron Company, Chelsea, Mass.

SMITHCRAFT FLUORESCENT UNIT

■

Lamps

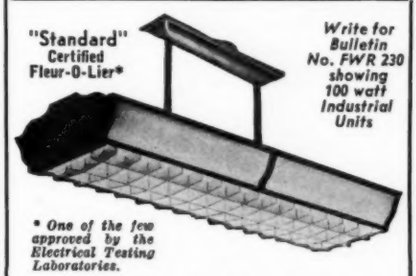
Three new fluorescent lamps have been announced. One is 100-watt 60-inch; another 6-watt 9-inch and the third a soft-white fluorescent lamp that may be had in several sizes and lengths. The 100-watt uses a T-17 tubular bulb that measures 2⅛-in. diameter and is designed for general lighting needs. The 6-watt lamp employs a T-5 round bulb and miniature bipin bases. For use in cabins of airplanes, in and on business machines and in curved show cases. The soft-white lamps come in 15, 20, 30 and 40-watt sizes and in 18, 24, 36 and 48-inch lengths. The 15 and 30-watt sizes have T-8 bulbs; the 20 and 40-watt are equipped with T-12 bulbs. General Electric Co., Nela Park, Cleveland, Ohio.

WHERE TO BUY

Equipment, Materials and Supplies for Electrical Construction—Maintenance—Repairs

"Standard" Certified Fleur-O-Lier*

Write for Bulletin No. FWR 230 showing 100 watt Industrial Units



* One of the few approved by the Electrical Testing Laboratories.

R. & W. WILEY INC.
777 Hertel Avenue — Buffalo, New York

THE RANGE-VENTOR
. . . . SELL IT ON ALL YOUR NEW HOME and REMODELING JOBS!!
Created for the new kitchens that are becoming increasingly popular . . . the 3-purpose RANGE-VENTOR. It ventilates, illuminates, and protects walls. Unit is complete with hood, fan, motor, switch, and cord. Available in either baked enamel on steel, or MONEL METAL. Write for complete descriptive literature.
UNIVERSAL BLOWER COMPANY
BIRMINGHAM, MICHIGAN

"FRIGID" QUALITY PRODUCTS
Manufacturers of
VENTILATING EQUIPMENT
EXHAUST FANS
SHUTTERS — ATTIC FANS
BLOWERS — INDUSTRIAL FANS
AIR CIRCULATORS
Write for Catalog and name of your nearest distributor. Low prices.
CIRCULATORS & DEVICES MFG. CORP.
100 Prince St. — New York City

UNDERWRITERS APPROVED
3 A G LITTELFUSES

Replaces large and bulky cartridge type fuses and their bulky mountings. Space savers. 16 sizes—ratings from 1/100 to 8 amps., 250 volts. All Underwriters' Approved. Write for catalog.
LITTELFUSE, INC.
4789 N. Ravenswood Ave. — Chicago, Ill.

New WHERE TO BUY Advertisements
received by February 21 will appear in the March issue, subject to space limitations.

Pickwick **STRATOLITER**
Modern Lighting in the Modern Manner

Write for Catalog and Discounts

An extremely attractive, efficient 4-light Fluorescent Luminaire suitable for store, office and general illumination. Suspension or flush mounting.
A complete line of Luminaires, Flourescent Light Strip with individualized Reflectors, Etc.
PICKWICK METALCRAFT CO.
489 Broome St. — New York, N. Y.

BIG SAVINGS
THE LOW COST
NELTO FLUORESCENT
UNION WIRED with ALZAK REFLECTOR
WRITE FOR OUR PRICES . . . FIRST!
Nelson-Tombacher Co., 224 Centre St., N.Y.C.

AN ALERT MFR.
— has a copy of the Directory of Electrical Wholesalers
AT HIS ELBOW
— to save sales time
$25.00 per copy
Wholesaler's Salesman, 330 W. 42 St., N. Y.

GLOBE FLUORESCENT FIXTURES

See Our New Line at Your Local Wholesaler
Get the newest facts on advanced principles of fluorescent lighting. See the fixtures that give the best in fluorescent lighting—that develop sales—that give you more profits.
Write for our new catalog—today! Address Dept. K.
GLOBE LIGHTING FIXTURE MFG. CO.
7th AVE. & 12th ST. — BROOKLYN, N. Y.

The **RATTAN** Man Says:
(Trade Mark Reg.)

"Use *The* **MARR**
No. 2 if you have a job requiring THREE No. 12 wires."

A Perfect Joint Connector
(Cap Made of Bakelite)

. . . and a permanent one, too. Simply insert the wires, turn on bakelite cap, and tighten with the screw driver.

Send for free samples.

See Your Electrical Dealer
Approved by Underwriters

THE RATTAN MANUFACTURING COMPANY
522 STATE STREET
NEW HAVEN, CONN., U. S. A.
GENERAL SALES AGENTS HATHEWAY AND CO.
75 MONTGOMERY ST., JERSEY CITY, N. J., U. S. A.

Send for your Copy
OF THE 1941 SIGNAL
FAN Catalog!

It illustrates the most advanced line SIGNAL has ever produced — new streamlined desk fans, pedestal fans and 20" and 24" Air Circulators. Every one of these many new numbers is designed to please, built to last and priced to sell. Yes, siree, SIGNAL has really got something.

SIGNAL ELECTRIC MFG. CO.
MENOMINEE, MICHIGAN
Offices in all principal cities

SIGNAL

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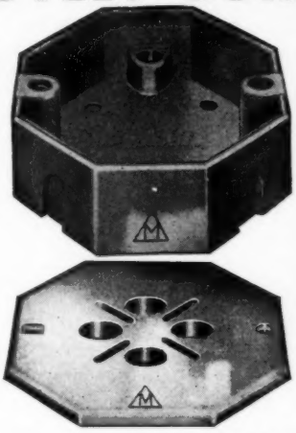
*See 1941 Electrical Buyers' Reference for additional information on these companies and their products.

Profit by USING

ILLINOIS

Dependable Porcelain

OUTLET BOXES



★ Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

Contractors who use these products not only establish themselves most securely with their customers but also build their business by making each job a true quality one. Send for bulletin.

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILL.

DASHBOARD CONTROL

PRESS A BUTTON ON THE DASH . . . GARAGE DOOR OPENS.

SEE OUR AD, PAGE 309 OF 1941 ELECTRICAL BUYERS REFERENCE

Doors and Operators, Inc.
Tiffin, Ohio — 528 Hudson St.

TEST-O-LITE

Tests Everything Electrical From 100 to 550 Volts

APPLIANCES
MOTORS
FUSES

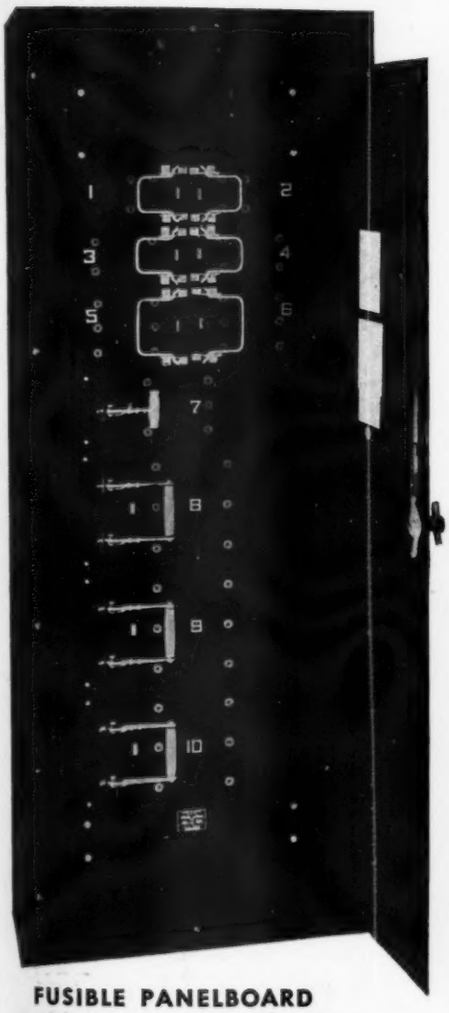
Indispensable to electricians. Equipped with Neon light which tells instantly where trouble lies in electric circuits, fuses, cut-outs, motors, radios, electric appliances; indicates hot or grounded wires; tells A.C. from D.C.

Only Test-O-Lite, original Neon tester, has exclusive patented safety features. Far superior to clumsy test bulb. Fountain pen size with pocket clip. Useful in home also. List $1.50 at leading jobbers.

L. S. BRACH
MANUFACTURING CORPORATION
57 Dickerson St., Newark, N. J.

Less cost... Less space

WITH THE NEW SQUARE D MH MULTI-BREAKER PANELBOARDS



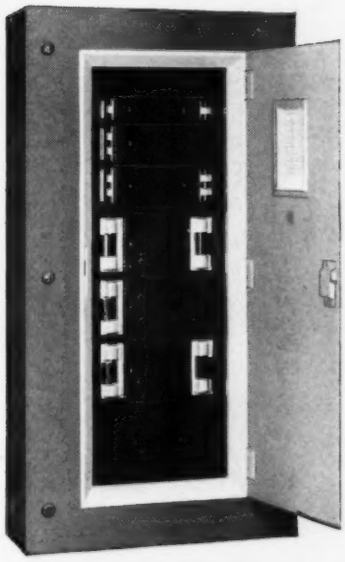
FUSIBLE PANELBOARD
Illustrated above is a standard fusible distribution panel for power and light.

COST OF 230-VOLT CIRCUIT BREAKER PROTECTION REDUCED SUBSTANTIALLY!

For a long time, plant engineers have appreciated the advantages of circuit breakers over fusible panels for the protection of power and lighting circuits. But—high cost has prevented many circuit breaker installations.

That price barrier has been removed! For 115 or 230 volt circuits, Square D now offers the new type MH Multi-breakeR Distribution Panelboards at drastically reduced costs. Prices are now comparable with fusible equipment.

But that isn't all. Space requirements have been reduced—tremendously. Contrast the size of the two panels illustrated—each does the same job. Even on new installations, space is usually an important factor. On rewiring jobs, the use of MH panelboard interiors in existing panel boxes will provide the additional circuits made possible by the use of the new thin wall wire.



NEW MH PANELBOARD
These two panels do the same job. Illustrations show comparable size. The MH takes just about half the space.

Breakers are furnished in 15 to 100 ampere capacities . . . 2 or 3 pole, for 115 or 230 volt, single phase and 3-phase A.C. systems. Since these breakers are common trip (an overload on any pole will cause all poles to trip), they are suitable for use in ungrounded and polyphase systems and cannot cause the single phasing of a polyphase circuit.

The panels are completely dead front—no live parts are exposed even when restoring service after an overload or short circuit. The simple rugged construction of the breaker units assures the same long life and trouble-free service which have made Square D Multi-breakeRs so outstanding.

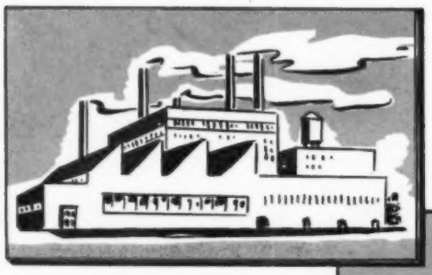
For complete information, write for Bulletin 5200. See how little it costs to provide modern circuit breaker protection.

SQUARE D EQUIPMENT IS AVAILABLE THROUGH ELECTRICAL WHOLESALERS—EVERYWHERE

SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO



FOR WIRING ALL TYPES OF BUILDINGS

Use

ADEQUATE WIRING SERVES AND SAVES

G-E HOME WIRING
provides completely adequate wiring for residences. Write for a bulletin.

G-E HIGH QUALITY WIRING MATERIALS

You'll find exactly the wiring materials you want in the G-E line for wiring any sort of building. The line is complete. G-E wiring materials are made to be used together and are designed for easy installation.

G-E conduit is easy to bend, threads are accurate, interior finishes are smooth. G-E BX and BraidX can be stripped quickly. G-E building wire is clean stripping and easy pulling. G-E wiring devices have large binding screws, wide mounting ears, etc.

G-E wiring materials are made from the finest raw materials obtainable. Your customers will be pleased with long, trouble-free service they give.

For further information see the nearest G-E Merchandise Distributor or write to Section CDW-182, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC